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of the Anatomy or dissection of the body of Man,

which usually are shewed in the publik Anatomicall exercises.

Methodically digested into 6 Books.

By Alexander Read. D: of Physick.

London

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With sundry Figures thereunto belonging.

The Sixth Edition.

By *ALEXANDER READ*, *Doctor of Physick; a fellow of the Physicians Colledge of* London, *and a Brother of the Worshipful Company of the* BARBER CHIRURGIANS.

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Matthew Jones

Lawrence Jones

John Jones

Edward Jones

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CAROLO *Magnæ Britanniæ Monarchæ Hiberniæque ac Galliæ Regi potentiſsimo fauſta omnia precor.*

EN offero Majeſtati veſtræ lucubratiunculas iſtas Anatomicas: Munus fateor te minimè dignum, quem Deus ad ſupremum ferè honoris in terris culmen evexit. Nihilominus ſi omnia juſto trutinæ examine penſentur, quivis æquus arbiter pronuntiabit eas

ad te properare debere. Cogitaverat pridem apud se Majestas vestra quàm utile, imo necessarium huic Reipublicæ sit multos habere peritos Chirurgos, sive Pax alma floreat, sive Bellum ingruat. Quapropter ea sanxit, ut doctus aliquis ac peritus medicus communionis hujus fratribus ex suggestu, singulis diebus Martis, huic exercitio destinatis, præcepta artis traderet ab auditoribus excipienda, atque Anotomicis dissectionibus temporibus constitutis præesset. Quum ea munia mihi obeunda ante aliquot annos commissa fuissent, animadverti illorum in rebus Anatomicis profectum mirè tardatum, quod nullum haberent compendium Anatomicum, lingua vulgari emissum. Ut huic desiderio occurrerem, compendiolum

tale

tale in lucem emisi, ex cujus lectione tyrones fructum aliquem percepere. Verum quum proficientibus visum fuisset nimis jejunum, sumpsi id iterum in manus, ac copiosiùs de humani corporis partibus disserui. Quum itaque secunda cura refictum in lucem emittendum sit, ad quem potius, quàm ad vestram Majestatem tendet, quæ primæ fœturæ auctrix fuit? Nec est quod verear me audaciæ, aut inverecundiæ crimen incursurum: Quùm mihi securitatem promittat eximia vestra comitas atque affabilitas erga omnes, quæ omnium amorem conciliant, ut dignitas regia timorem, Quæ duo Sceptra Regibus firmant. Unum hoc Opellæ huic ex hac Dedicatione promittere possum: Eam gratiorem omnibus futuram

turam, quod tanti ac talis Regis nomen sibi præscripserit. Scribebam *Londini* 4. *Calend. Octob.* Anni ab exhibito in carne *Messiah*, supra millesimum sexcentesimum tricesimi septimi.

Vestræ Majestatis

cultor humillimus,

ALEXANDER REIDUS
Scoto-Britannus.

To

To the Reader

Courteous Reader,

NOW I *preſent to Thee the fifth Edition of the* Manual of Anatomy, *which ſhall be the laſt that ſhall be publiſhed in my life time, which is not far from its period. The Hour-glaſs haſteneth, and but a few ſands remain unrun. The book of the Breſt, and the book of the Brain are altogether new, as the book alſo of the Bones. In this Edition all things are ſet down more fully, Methodically, and Correctly, then in the former. If it give thee contentment, and further thy proceedings,* I *have obtained that which I aimed at: for I expected no other reward of my labour. I have endeavoured to ſet down all things attemperating my ſelf as plainly and ſhortly as I could, to the capacity of thoſe, who begin to addict their minds to this ſtudy.*

I am not so in love with my own labours, as to think that they can profit such as have made a reasonable progress in [illegible]. However, it will serve any one instead of an Index, to present briefly unto the mind those things which they may find set down at large, in the ample discourses of learned Anatomists, as well Ancient as Modern. Make then of it what use thou shalt think fittest, and wish well to the Author, who hath endeavoured to ease thee of some pains, which thou must have taken to have contrived such a compend as this is, of the description of the parts of the body of Man.

Vale.

The

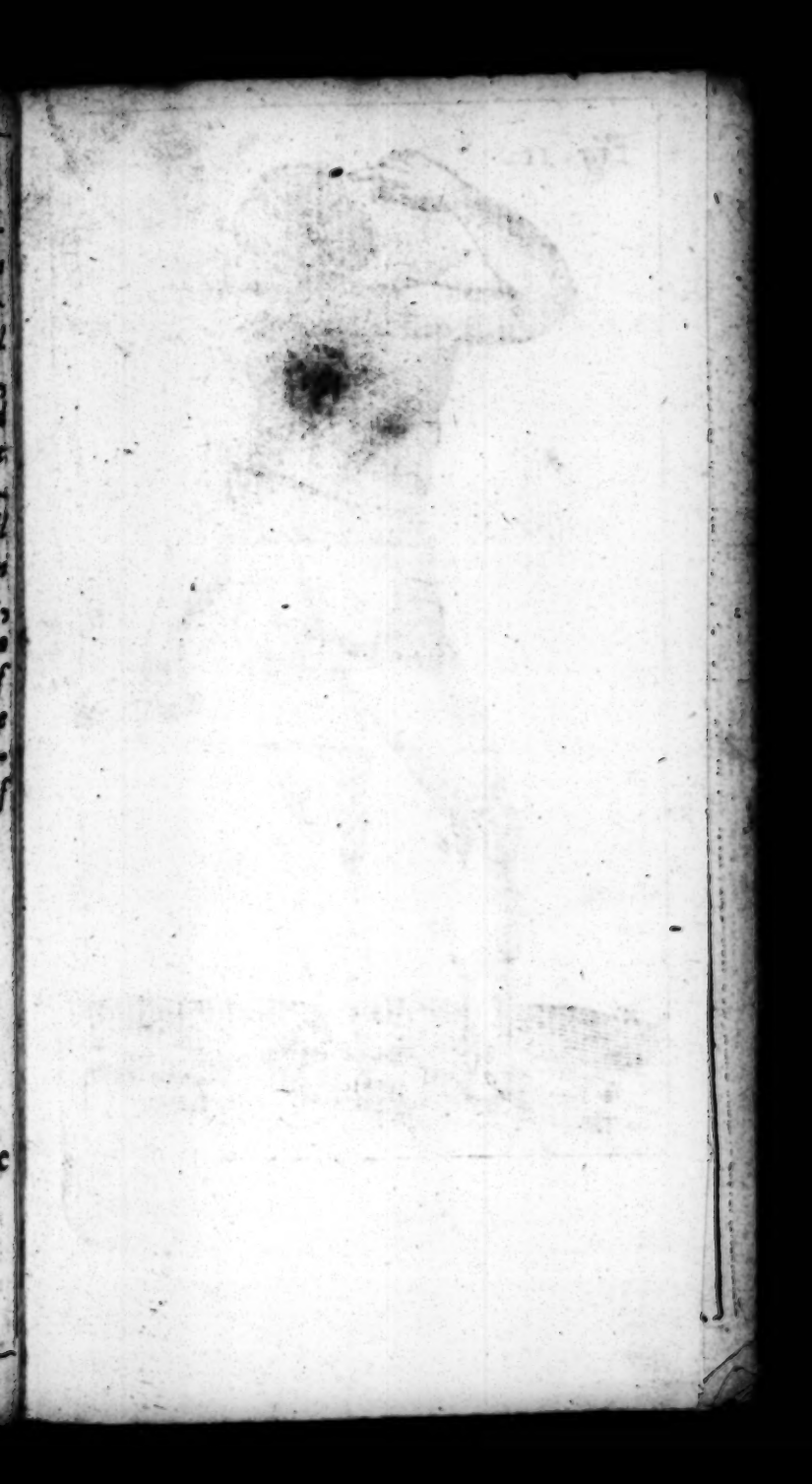


Fig. II.

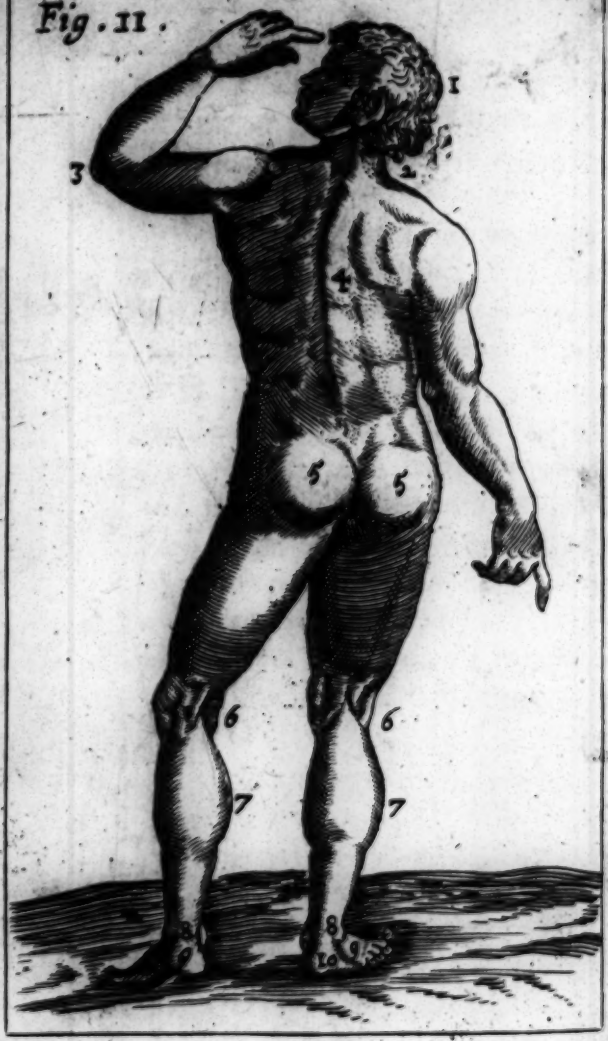
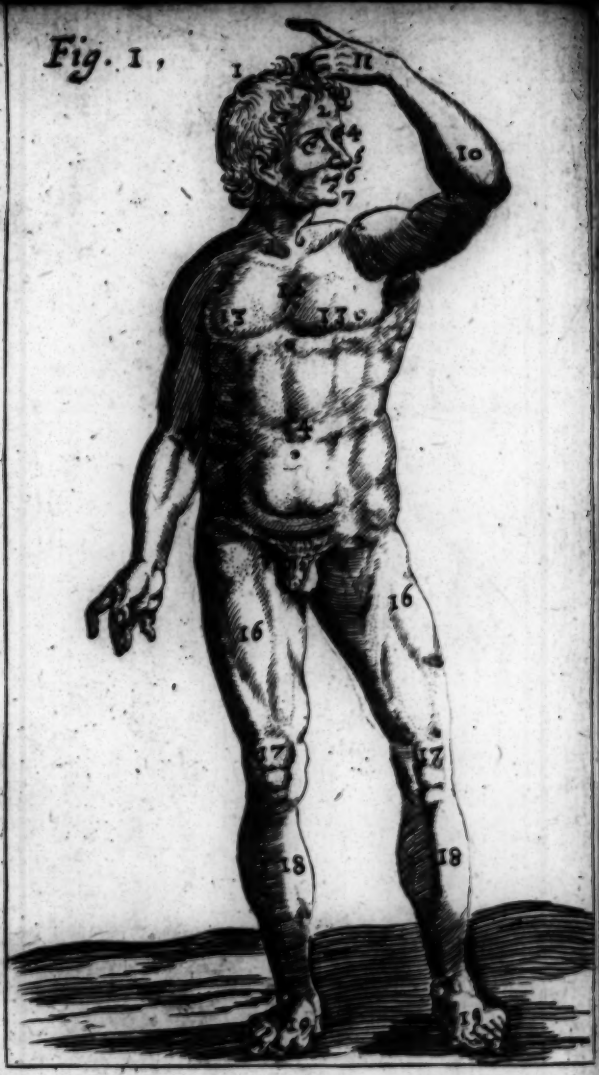


Fig. 1.



The Explication of the first Figure.

1. *The hairy Scalp.* 2. *The Forhead.* 3. *The Ear.* 4. *The Eyes.* 5. *The Nose.* 6. *The Mouth.* 7. *The Chin.* 8. *The Temple.* 9. *The Cheek.* 10. *The Arm.* 11. *The Hand.* 12. *The Breast.* 13. *The Sides.* 14. *The Belly.* 15. *The Genitals.* 16. *The Thighs.* 17. *The Knees.* 18. *The Legs.* 19. *The Feet.*

The Explication of the second Figure.

1. *The back part of the Head.* 2. *The Shoulder.* 3. *The Elbow.* 4. *The Back.* 5. *The Buttock.* 6. *The Hams.* 7. *The Calves of the Legs.* 8. *The Ankles.* 9. *The Insteps.* 10. *The Heel.*

These two figures are to be placed between the Epistle to the Reader and the first Chapter.

The Number and Contents of the Books.

THE first Book containeth the description of the parts of the Belly, and hath 27 Chapters.

The second Book containeth the description of the parts of the Breſt, and hath 12 Chapters.

The third Book deſcribeth the head, and hath 26 Chapters.

The fourth ſetteth down the veins, arteries, and ſinews of the limbs, and hath 7 Chapters.

The fifth Book deſcribeth the muſcles of the whole body, and hath thirty one Chapters.

The ſixth ſetteth down the bones, and hath 28 Chapters.

THE

THE FIRST BOOK of the lower Cavity, Called *ABDOMEN.*

CAP. 1.

Of the division of the parts of the Body of Man in generall.

ANotomy is an artificiall separation of the parts of the body, by section, practised to attain to the knowledge of the frame of it, and the use of each part. In Anatomicall exercises, first the whole carkasse doth offer it self, then the parts.

The description of Anotomy.

The whole hath four Regions, to wit, the fore & back parts, & the lateral,

The Regions of the whole What the whole & a part signifie

lateralls, which are the right & left.

I call the whole that which containeth the parts, and a part that which is contained in the whole, according to the most ample acception of the term part; for in a more strict acception a part is a body solid cohering with the whole, endued with life, and framed to perform some function.

Things required in a part being strictly taken

1. A part then must be the solid: humours then cannot be numbered amongst the parts, because they are fluid.

2. Secondly, it must have life: and so the extremities of hairs & nails are not to be accounted parts.

3. Thirdly, one part must not nourish another: and so the blood, fat, and spirits are not parts.

4. Fourthly, it must have a circumscription.

5. Fifthly, it must be united with the whole.

6. Sixthly, it must have some action and use.

The differences of the parts.

The principall differences of parts are taken either from their nature or functions. From their

nature,

nature, parts are said to be either similary or dissimilary.

What a similary part is.

A similary part is that whose particles are of the same substance and denomination with the whole: as every portion of a bone is a bone. It is otherwise called a simple part.

The number of simple parts.

Of simple parts there are ten in number, to wit, The skin, a membrane, the flesh, a fibre, a vein, an artery, a nerve, a ligament, a cartilage, a bone: they are comprehended in these two verses.

Cartilago, caro, membrana, arteria nervus.
Vena, ligamentum, cutis, os, lentissima fibra.

Of a tendon.

To these a tendon, which is the principall part of the muscle, may be added; for the substance of it, it is simple, without any composition.

The differences of simple parts.

Of the former simple parts, some are simple indeed, and these are in number seven; the skin, a membrane, the flesh, a fibre a cartilage,

cartilage, a bone. The reſt are onely ſimple to the eye or ſenſe, and not to reaſon; for, a nerve (for example) is compoſed of many filaments covered with a membrane.

What a diſſimilary part is.

A diſſimilary part is that whoſe portions are neither of the ſame ſubſtance, nor the ſame denomination; as a muſcle in the which are fleſh, a nerve; and a tendon. It is otherwiſe called a compound part, and an organical part.

Things to be obſerved in an organical part.

In an organicall part four particles are found; Firſt, the chief particle, as the chryſtallin humour in the eye.

1.

Secondly, that particle, without the which the action cannot be performed, as the optick nerve.

2.

Thirdly, that which furthereth the action, as are the membranes and muſcles.

3.

Fourthly, that by the which the action is preſerved, as the eyelids.

4.

The degrees of an organicall part.

Of organicall parts there are four degrees.

1.

The firſt is made onely of

the

the ſimilars, as a muſcle.

The ſocond receiveth the kind of organicall parts, and ſimilaries, as a finger. 2.

The third admitteth thoſe of the ſecond degree, as the hand. 3.

The fourth is made of the third and other parts, as the arm. 4.

The differences of parts taken from their function.

Parts from their function are ſaid to be either ſuſtaining, or ſuſtained. The bones ſuſtain the frame of the whole body, the reſt are ſuſtained. Now theſe are the cavities or the limbs.

CAP. II.

Of the circumſcription, regions, ſubſtance, & parts of the Abdomen.

OF all the parts of the body which are ſuſtained, we are to begin diſſection with the cavities: Firſt, becauſe they offer themſelves to the view in the fore region of the body.

Secondly, becauſe they being moiſt, and apt to receive the impreſſion

preſſion of the external heat, ſooneſt putrifie and ſend out noyſome ſmels. The cavities are appointed to receive the principall parts, and thoſe which miniſter unto them. Wherefore there are three cavities, according to the number of the principall parts. The head is for the brain, the breaſt is for the heart, and the belly for the liver. And becauſe this cavity is moſt ſubject to putrefaction you are to begin at it. Now four things concerning it offer themſelves. Firſt the circumſcription or bondage of it. Secondly, the regions of it. Thirdly, the ſubſtance of it. Fourthly, the ſpeciall parts of it.

As concerning the circumſcription of it, it is ſevered from the breaſt by the midriff. It is bounded above by the *cartilago enſiformis*, and beneath by the ſhare bones. The regions of it are three, the uppermoſt, middlemoſt, & lowermoſt. The uppermoſt, which is bounded between the *mucronita cartilago*, and three inches above the navell, about the ending of the ſhort ribs, hath three parts:

The

The latterall, which are called *hypochondria*, or *subcartilaginea*, because they lie under the cartilages of the short ribs. In the right by *hypochondrium* lieth the greatest part of the liver, but in the left the spleen, and greatest part of the stomack. The third part is that which before lieth between the two lateral parts, and is properly called *epigastrium*, because the stomack lieth under it. In this part remarkable is the pit of the breast, which is called *scrobiculus cordis*, by the modern Writers. The middlemost part extendeth it self from three inches above the navel, to three inches under it. The fore part is where the navel is, from whence it is called *regio umbilicalis*. The 2 lateral parts have no proper denominations. In the right are contained *intestinum cœcum*, with part of *Colon*. In the left part of it, a portion of *Jejunum*, & the rest of *Colon*. The rest of *Jejunum* is under the navel. The navel in man is wrinkled, as the forehead of an aged woman; but in other

other creatures it is onely a hard knot without hairs, having no wrinkle. It hath no latteral parts, having no proper names; although *Laurentius lib. 6. Histor. Anatom.* Affirmeth it to have, and gives them names; in this region is contained the whole hungry gut.

3. *The lower region.*

The lower region is called ὑπογάστριον: This region hath three parts, the lateral and the middlemost: The lateral, which reach to the *hypochondria*, are called λαγόνες, because they are the seat of lust, which is called λαγνεία. By *Hippocrates* they are termed κενεῶνες, because they being placed between the hanch-bones, and ribs, are lank, and seem to contain nothing. In Latine they are called *Ilia*, because the *Ilium intestinum* lieth under them on every side. Besides this, in the right part are placed portions of the *Colon*, & *cæcum intestinum*, which are tyed together. In the left part are contained a great part of the *Colon*, and the *intestinum rectum*.

Ilia.

The

The fore-part of the *Hypogastrium* by *Arist. lib. 1. Hist. animal. 3.* is called ἵτρον, which *Gaza* calleth Abdomen and Sumen. Under it lyeth the *pubes*, which word signifieth both the hairs, and the place where the hairs grow, which appear to bud in girles the twelfth year but in boyes the fourteenth year, when way is made for the monethly courses and seed, the skin being there made thinner, the heat encreasing in them. At the sides of the *pubes* appear βουβῶνες, or *Inguina*, the groines. Under this middle region are contained the bladder, the *intestinum rectum*, and the matrix in women.

Inguina,

The hindermost parts are called *lumbi*, the loins, & they reach from the bending of the back to the buttocks, called, *nates, ab innitendo*, because when we sit, we rest upon them. The fleshy part on each side is called φύα, ἀπὸ τοῦ φαύειν, *a palpando*, from culling, or clapping. In the right loins, the right kidney; but in the left the left kidney is contained.

The hindermost parts.

CHAP.

CHAP. III.

Of the common containing parts of the belly.

THe common containing parts of the belly are four; the skarfskin, the skin, the fat, and the *membrana carnosa*.

The skin in a man is called *cutis*, but in beasts *aluta*; in Greek it is called Δέρμα, and Δορὰ; either ἀπὸ τῦ δέρεσθαι, because it is easily flead off; or from τέρμα, seeing it is the end and superficies of the whole body. Of all the membranes of the body it is the thickest.

It hath a double substance, the one is externall, called ἐπιδερμὶς ὅτι ἐπὶ τὸ δέρμα τίθεται, because it is placed upon the skin as a cover, but is termed *cuticula* in Latine; for it is as large as a skin, & more compact; for watersh sharp humours, passing through the skin, are staid by the thickness of this, and so pustules are caused. In man it is as the peelings of the onions. It is without blood & without feeling.

Cuticula.

Theer

Three causes concur to the generation of it; to wit, the material cause is a viscous and oleous vapour of the blood. The internall efficient cause, the naturall heat of the subjacent parts raising it up. The external efficient cause is the externall coldnesse, partly of the aire, partly of the skin it self: It is engendered even as the thin skin in milk, and fat broth; it is hardly separate from the skin with a knif; but easily in the living creatures by a vesicatory, and in dead persons by fire, or scalding hot water.

First, the use of it is to defend the skin, which is of an exquisite sense, from external immoderate, either heat or cold. In cold weather it breaketh the cold, that the perspiration should not be altogether hindered: In hot weather by its compactnesse it hindereth too great perspiration.

Secondly, to be a middle between the skin, and the object of feeling.

Thirdly, to stay the ichorous substance from issuing from the veins

veins and arteries; for this we see when the *cuticula* is rubbed off by any means.

2. The true skin is six times thicker than the skarf skin: in children, women, & those which are born in hot countreys, it is thinner; but in men, and in those who inhabit cold countrys, it is thicker.

The Negroes become black, because they having a softer skin, and large pores & loose, many vapours of the adust humours, which are raised with the sweat; the grosser substance whereof by reason of the excessive heat, being dried, & burned, caused the blacknes of the skin; for their infants are not born black, but reddish; & they afterwards become black, the *cuticula* growing in them as in us.

The skin in the fore-head and sides it is thin, thinner, yet in the palm of the hand, but thinnest of all in the lips and cods. In the head, back, and under the heel it is thickest. Under the heel the *cuticula* in some will be as thick as a barley corn.

The

The pores will appear in the skin in the winter time, it being bared; for where they are, the *cuticula* will appear as a Gooſes skin.

The skin hath an action, to wit, the ſenſe of feeling.

3. Of fat.

Pinguedo πιμέλη, eſt humor oleoſus noſtri corporis à calore moderato ſubjectarum illi partium elevatus, ac inter membranam carnoſam ac cutem concreſcere, quæ partes ſunt denſiores ac frigidiores. Ejus duæ ſunt ſpecies, axungia πιμέλη, & ſæ-num, ſive στέαρ.

Its kinds.

They differ; for firſt, *axungia* is in beaſts not horned, wch are full toothed; but *ſævum* in beaſts not horned, wch are not full toothed.

Secondly, *axungia* is eaſily melted, but not ſo eaſily congealed; but *ſævum* is not eaſily melted, but is eaſily congealed.

Thirdly, greaſe is not brittle, but tallow is. The fat under the skin is greaſe; but in the caul, kidneys, the heart, the eyes, and about the joints, it is tallow.

The uſes of it are theſe: Firſt, it defendeth the body from the air, ſo

so Apothecaries, when they mean to preserve juices, they pour oil upon them.

Secondly, it preserveth the natural heat.

Thirdly, it furthereth beauty by filling up the wrinkles of the skin.

Fourthly, in the Muscles it filleth up the empty places, it is under the Vessels that they may pass safely; in the intrals it helpeth concoction, in the Buttocks it is as down in a pillow.

4. *Membrana carnosa.*

Membrana carnosa, or ὑμὴν σαρκώδης, so called in Man; not that it is in him fleshy, but nervous, and so *Nervea*; but because in Beasts, which the Ancients used most commonly to dissect, it is endued with fleshie Fibres; in the birth it is red, but in those of ripe age white; in the forehead and neck it is more fleshy. Within it is bedewed with a viscuous Humour, to further their motion by keeping the superficies of them from desiccation, which otherwise might fall out by reason of their motion. It is of an exquisite sense, whereof

a viſcuous Humour, to further their motion by keeping the ſuperficies of them from deſiccation, which otherwiſe might fall out by reaſon of their motion. It is of an exquiſite ſenſe, whereof when it is pricked with ſharp Humours, it cauſeth groovings, ſuch as are felt in the beginning of Ague-fits. Firſt it preſerveth the heat of the internal parts. Secondly, it furthereth the gathering of the fat. Thirdly, it ſtrengtheneth the Veſſels which paſs between it & the skin. *Its uſes.*

CHAP. IV.

Of the proper containing parts.

THE proper containing parts, are the Muſcles of the belly, and the *Peritonæum*. Of the Muſcles we have ſpoken elſewhere, *Chap.* 17.

Penitonæum is tied about to the Midriff, below to the ſhare and flank-bones; in the fore-part firmly to the tranſverſe muſcles, but chiefly to their Tendons about the *Linea alba*; behind to

the fleshly heads of these Muscles loosely, and the membrance of the Nerves, which come from the *vertebræ* of the loines. The end of this firm connexion is to press equally the belly, for the expulsion of the Ordure, and breathing. If this connexion had not been, the *Peritonæum* would have become wrinkled, the Muscles being contracted. If it had not been loose tied to the fleshy parts, the contradiction of them in the compression of the belly had been hindred.

As for the proceeding of it, *Fallopius* will have it to proceed from a strong twisting of sinewes, from whence the *Mesenterium* hath its beginning. Some will have it to proceed from the Ligaments by the which the *vertebræ* of the loins & the *Os sacrum* are tied together.

Picolhomineus will have them to be framed of those nerves which spring out of the *spinalis medulla*, about the first and the third *Vertebra* of the loins, which are tied together by both the meninges when

when they march further: Here it is very thick, because it was to be much extended.

It is double every where, but chiefly about the *vetebræ* of the loins, where between the duplications lye the *Vena cava*, the *Aorta* and the Kidneys. In the *Hypostrium*, two tunicles are apparently seen, between which the bladder and matrix lye. All the parts which receive nourishment from the *Vena cava*, are seated between the coats, as the forenamed parts; but those which receive nourishment from the *Vena porta*, a are they which serve for concoction of nourishment, are not; the umbilical Vessels also are placed in the duplicature of the *Peritonæum*, that they may march the more safely.

To the beginning of the productions of the *Peritonæum* the inner coat cleaveth firmly, and shutteth the hole by the which the spermatick vessels pass from the lower part of the belly. If this be broken, the outer coat is re-

laxed, and ſo a rapture is cauſed.

The *Peritonæum* is thickeſt; Firſt, Where there are manifeſt humours, to hinder the breaking of the ſubjacent parts, and iſſuing out of them, as above the ſtomack.

Secondly, where many veſſels & ſpirits are, as above the ſpleen.

Thirdly, where much ſtretching is required, as above the bladder, matrix, and ſtomack.

CHAP. V.
Of the Omentum.

Of the part contained in the lower belly.

THE parts contained ſerve either for nutrition, or procreation. As for the parts ſerveing for nutrition, they either ſerve for chylification, or ſanguification. The principal efficient cauſe of chylification, is the ſtomack; but the adjuvants are the Caube, and the *Pancreas*.

The Principal efficient cauſe of ſanguification, are the liver and ſpleen, but the other parts are the adjuvant cauſes. Of theſe ſome receive the excre-

men

ments of the chylification, as the guts. The excrements of the ſanguification are two, choler, and the watriſh humour. The thin choler is received by the *veſica fellea*; but the groſs choler, by the *meatus cholidochus*: The watriſh humour is turned to the kidneys, and from thence to the bladder, by the ureters.

The parts appointed for procreation, are the genitals, both in men and women. Next then to the *Peritonæum* is the *Omentum*, or caul, in Greek it is called ὄμεντον, ἀπὸ τοῦ ὑπερκεῖσθαι, becauſe it ſeemeth to ſwim above the upper guts. The *Arabians* call it *Zirbus*.

Its ſubſtance.

It is compoſed of two membranes.

The uppermoſt doth ſpring from about the bottom of the ſtomack, from the common coat of it, and is tied to the hollow part of the liver and ſpleen.

Its connexion.

The lowermoſt doth ſpring from the *Peritonæum*, immediately under the midriff towards the back, and is tied to the hollow

part of the liver, to the midriff, to the *duodenum inteſtinum*, to the convex part of the ſpleen; and laſt of all, to all that part of the *Colon* which marcheth under the ſtomack.

Its veins. It hath veins onely from *porta gaſtoepiplois dextra & ſiniſtra*: they are inſerted into the upper membrane, but *epiplois dextra & poſtica* into the inferiour membrane.

Its arteries. It hath ſo many arteries from *ramus cæliacus*, & *meſcentericus*. It hath ſmall ſinews from the coſtal branch of the ſixth pair. It

Its ſinews hath much fat: if it be plentiful, and the caul reach to the *os pubis*, in women it cauſeth ſterility, by compreſſing the mouth of the matrix; in men it cauſeth a Rupture, by relaxing the *peritonæum*: This rupture is called *epiploenterocele*.

Its figure 6 *De anat. adminiſt.* In figure it repreſenteth a Faulconers pouch, according to *Galen*: The mouth is round, and the bottom is made by the two membranes joined together. This will appear if you fill it with water, by *Galens* advice. It

It is then of ſubſtance membranous, that it might admit dilatation and extenſion. It is thin, that it ſhould not burden the ſubjacent parts; it is compact to hinder the diſſipation of the internal heat, and to repel the external cold. *The reaſon of the frame of it.*

The fat is about the veins and arteries, to ſtrengthen them from being co r preſſed by the repletion of the belly, and other motions. When the ſtomack is full, and the guts empty, the upper membrance is raiſed, the lower remaining in its own place; but if the guts be full, and the ſtomack empty, then the lower membrane riſeth up, the upper remaining in its own place. It is tied to the ſtomack, being a middle part between the Colon and the ſpleen; and that it ſhould not totter from ſide to ſide, it is tied in the right ſide to the colon and liver; but in the left ſide to the ſpleen. *The fat*

It hath its beginning from thoſe parts unto which it is tied, that it might receive veins and arteries *Its beginning.*

from thence for blood and life. The lower part is free and untied, that ſometimes the upper, ſometimes the lower membrane might riſe up.

The uſes of it are three: Firſt, it cheriſheth the internal heat of the ſtomack and inteſtines.

Secondly, it miniſtreth nouriſhment to the parts in the time of famine, *Galen. de uſ. part. l.* 2. *c.* 11.

The third is to contain the humours flowing from the inteſtines, which the glandules cannot receive wholly at one time, *Hippoc. lib. de Glandulis.*

An Obſervation Creatures which have no caul, help the concoction, by doubling their hinder legs, and reſting their belly upon them, as Hares and Conies.

Another. They who have had a portion of it cut off, becauſe it was corrupted, having fallen out by reaſon of a wound received in the *Abdomen*, have afterward a weak concoction, and are enforced to cover the belly well. See *Galen. lib.* 4.

lib. 4. *de uſu part.* 9. where he proveth this by example.

CHAP. VI.

Of the Gula.

THE Gullet or weazand is an organical part, which beginneth about the root of the tongue, and paſſeth from thence directly between the wind-pipe, the *vertebræ* of the neck, and the four firſt *vertebræ* of the breſt, upon the which it reſteth; but when it is come to the fifth *vertebra* of the breſt, it giveth way to the trunk of the great artery deſcending, by turning a little to the right ſide: afterward accompanying the artery to the ninth *vertebra*, there it is raiſed up by means of the membranes from the *vertebræ* and marching above the artery, it paſſeth through the nervous body of the midriff, and it is inſerted into the left orifice of the *ventriculus*: about the eleventh *vertebra* of the breſt. *The marching of it.*

The names of it.

It is properly called στόμαχος ὅτι στενὸς καὶ μακρὸς, *quia angustus & longus:* see *Aristot.* 1. *histor. animal.* 16. It is also called οἰσοφάγος ὅτι οἴει τὸ φάγημα *quod cibum ad ventriculum vehat.*

Its structure.

It is framed of three membranes. The first is the uttermost and common, compassing the two proper, which it hath either from the *peritonæum*, according to some, or from the ligaments of the *vertebræ* of the neck and breast upon which it resteth. The second is the middlemost, and it is fleshy and thick, and hath onely transverse *fibres*. The third is the innermost, and it is membranous; and hath onely small and straight *fibres*.

Its connexion.

It is joined to that membrane which covereth the throat, palat, mouth, and lips; so that before vomitting, signs of the lips will appear.

The vessels.

It hath veins both from the *vena cava*, and the *porta*; for it hath springs from *vena sine pari*, while it is yet in the breast: but where

where it is joined to the ventricle, it hath ſome twigs from *ramus coronarius*, which proceedeth from the *porta*.

It hath arteries from the intercoſtal arteries, and *ramus cæliacus coronarius*.

Nerves it hath from the ſixth pair, which are carried obliquely, ſafety, as *Galen* noteth *l. 6. de uſu part.* and are very many; which is the cauſe that the parts about the upper orifice of the ventricle are ſo ſenſible.

It hath four *Glandules*; two in the throat, which are called *Tonſillæ*, or Almonds, common to the *Weazand* and the *Larinx*, which prepare the pituitous humour to moiſten them; other two it hath about the middle of it, towards the back, about that place where the *aſpera arteria* is divided into two branches, under which it lieth. *Its glandules.*

The weazand ſerveth as a funnel to carry meat and drink to the maw; for it receiveth them by dilating its proper internal coat, and *The uſe of it.*

and turneth them down by the constriction of the middle-most coat, and the muscles of the *Pharynx*.

CHAP. VII.
Of the Ventriculus *or* *Stomack*.

Its denomination

THat part which we term the Stomack in English, in Latine it is called *Ventriculus*, to distinguish it from the great ventriculus. In Greek, γαστηρ and κοιλια, from its cavity.

Its situation.

It is placed immediately under the midriff, which it toucheth; wherefore if it be too full it causeth a difficulty of breathing, by hindring the motion of it. In the forepart and in the right side, it is covered with the hollow part of the liver; in the left side by the spleen; towards the back by the *aorta*, the *vena cava*, and the *pancreas*, which further its heat.

The bigness of it is commonly such, as is capable to receive so much food at one time, as is sufficient

cient for nutrition. It is leſs in women then in men, to give way to the diſtention of the matrix. They who have legal mouths, have large ſtomacks.

It is joined with the *gula* on the left ſide, where its upper orifice is: it is tied to the *duodenum*, where the lower orifice is on the right ſide. The bottom is joined to the upper part of the caul. *Its connexion.*

The ſubſtance of it is membranous, that it might admit diſtention and contraction. It hath three membranes. The firſt is common, which it hath from the *peritonæum* about the upper orifice; it is the thickeſt of all thoſe which ſpring from the *peritonæum*; the fibres of it are ſtraight. *Its ſubſtance.*

The ſecond is fleſhy, and the fibres of it are tranſverſe, under which a few oblique and fleſhy lye.

The third is membranous, endued with all kinds of fibres; the ſtraight are moſt conſpicuous and plentiful, to embrace the food firmly, until chylification be per-

perfected, as the second membrane hath oblique to expel the chylus.

Its orifices. 1. It hath also two orifices.

The one is in the left side, called *sinistrum*, wider than that in the right, that meat not well chewed might the better pass. It is called in Greek καρδία, *Cor*, from whence the pains which happen in it are called καρδιαλγίαι, and καρδιωγμοὶ, because there is a great consent between it and the heart, by reason of the twigs of nerves which proceed from the same branch, which do spring from the sixth pair, communicate to both; so that one being affected primarily, the other must suffer by consent.

This hath orbicular fibres, that the meat and drink being once received within the capacity of the stomack, it might be exactly shut, lest fumes and the heat should break out, which might hinder concoction.

The other by the Græcians is called πυλορὸς; *janitor*, or door-keeper,

keeper, becauſe it, as a Porter, doth make way for the *Chylus* to deſcend to the *duodenum*: It is not wide as the other *orifice*, becauſe it was onely to tranſmiſs the elaborate *Chylus*: wherefore beſides its tranſverſe fibres, it hath a thick and compact circle, repreſenting the ſphincter muſcle, that it migt the more eaſily open and ſhut.

It hath veins, firſt, from the trunk of *vena porta*, and this is *pyloricus ramus*, or from the branches of the ſame: wherefore from *ramus ſplenicus* it hath *gaſtrica*, from whence *Coronaria* ſpringeth; *Gaſtroepiplois ſiniſtra*, and *vas breve*, from the *ramus meſentericus*, before it be divided it hath *Gaſtroepiplois dextra*. *Its veins.*

It hath *Arteries* from *ramus caliacus*, which do accompany every vein.

It hath many nerves from the ſixth pair, which with the *gula* paſſing through the midriffe, croſs one another; for the right ſinew doth compaſs the left and fore- *Its arteries.*

part;

part; but the left, the right and hinder part of the ſtomack. So that the upper part of the ſtomack is of an exquiſite ſenſe. Theſe three veſſels paſs between the common and proper coats, and end in their orifices, in the internal membrane.

The cauſe of hunger

It is the ſeat of hunger, and ſooneſt doth feel the defect of aliment: for blood being ſpent in the veins, upon the nouriſhment of the body, the *fibres* of the internal membrane of the ſtomack are contracted, and ſo this pain, which is called hunger, is cauſed.

Its action Chylus.

The action of the ſtomack is Chylification: now *Chylus* is a white juice reaſonable thick, like Barley cream, wrought by the faculty of the ſtomack, out of the aliments. This is chiefly elaborate by the heat of the ſtomack, yet the adjacent parts putting to their helping hands; as in the right ſide, the liver; in the left, the ſpleen: above the midriff, below the guts, before the caul, behind the trunks of *vena cava*, and

and the *aorta*. This heat of the ſtomack is temperate, and ſomewhat moiſt, that this concoction might reſemble boiling.

Its figure.

Of figure, it is round moderately; partly, that it ſhould not take too much room; partly, that it might receive much. It is ſomewhat long, and hath two orifices higher than the bottom, leſt if one ſhould have been in the bottom, the aliment unconcocted ſhould have iſſued out of it.

CHAP. VIII.

Of the Inteſtines, or GUTS.

The etymon.

THE Guts are called in Latine *Inteſtina*, in Greek Ἔντερα ἀπὸ τὸ ἐντὸς εἶναι. They begin at the *Pylorus*, and end in the Fundament.

The figure.

They have a round figure, that they might contain ſufficient nouriſhment.

Their ſubſtance.

They are of a membranous ſubſtance, that they might readily have

have constriction and dilation.

Their length. In length, they are six times as long as the whole body.

Their coats. They have three coats, one common from the *Peritonæum*, but mediately; for in the *Duodenum*, and that part of the *Colon* which cleaveth to the stomack, it proceedeth immediately from the lower membrane of the caule; but in the *jejunum*, *ileum*, the rest of the *Colon*, and thick guts, it proceedeth from the membranes of the *mensenterium*.

They have two proper, to retain, and expel readily: The outermost is membranous, the innermost nervous; although it seem to be fleshly, by reason of the crusty substance with which it is lined; which is framed of the Excrements of the third concoction of the guts themselves It is also glased with a mucous substance, which is nothing else but an excrementitious fiegmy substance, bred in the first concoction: This furthereth the expulsion of the *faces*, and hindereth

reth excoriation, which might be cauſed when ſharp humours paſs through them.

The fibres.

This internal membrane in the ſmall guts hath obl que fibres, but the external tranſverſe, becauſe theſe are appointed for the retention and expulſion of the *chylus*. But in the thick guts the inner membrane hath tranſverſe, but the outer hath oblique and ſtraight, becauſe they are appointed for the expulſion of the excrements: The inner membrane of the ſmall guts is full of wrinkles, to ſtay the *Chylus* from paſſing too ſoon. Between the common coat & thoſe which are proper, the *venæ & arteriæ Meſaraicæ* march.

Their veins.

The veins flow from the *Porta*, although not from the ſame branch: For the *duodenus ſurculus*, is ſent into the *duodenum*, and the *Hemorrhoidalis*, to the left part of the *colon*, and the whole *rectum*, as the *dexter meſentericus* is ſent to the *jejunum*, *cæcum*, *ileum*, and the right part of the *colon*. *Epiplois poſtica* is inſerted into the middle part

part of the *colon*, which marcheth transversly under the stomack; besides these, a sprig from the *ramus epigastricus* of the *vena cava* is sent to the *intestinum rectum*, wch maketh the external *hæmorrhoidal*.

The Arteries. The arteries spring partly from *ramus cœliacus*, partly from both the *mesenterica*, to the *duodenum*, and the beginning of *jejunum*; a sprig is sent from the right *ramus cœliacus*; but to the rest of the *jejunum*, to *ileum cæcum*, and the right part of *colon mesentericus superior*: to the left part of *colon*, and to the *intestinum rectum*, *mesentericus inferior* is sent. At the last, *epiplois postica*, which riseth from the lower part of *arteria splenica*, which is the left branch of *arteria cœliaca*, is sent to the middle part of *colon*, which lyeth under the stomack.

The Nerves. Nerves they have from the sixth pair; the *duodenum* hath small twigs from the stomach, which go to the *pylorus*. The other guts have very many, which spring from the branch which is be-

beſtowed upon the roots of the ribs: but the *inteſtinum rectum*, about the *podex*, hath four twigs from the fifth conjugation of thoſe which ſpring from the *os ſacrum*. This is the cauſe why ſo great pain is felt in the *colon*, & *rectum*, when they are ill affected.

The guts have fat without, and not within. *The fat.*

The guts are of two ſorts; for they are either thin or thick. *The differences of the guts.*

The thin, which have thinner membranes, are in number three. *The thin.*

The firſt is *duodenum*, becauſe it is thought to have 12 inches in length. It doth paſs directly under the ſtomack, to the beginning of thoſe guts, which begin to be gathered by the *meſenterium*, for this is tied with it. 1.

The ſecond is *jejunum*, or the hungry gut; for in dead carkaſſes it is for the moſt part found empty; partly, by reaſon of the multitude of the veins; partly, by reaſon of the acrimony of the choler, which proceedeth pure from 2.

the

the liver. In length it is 12 hands breadth and three inches, and as broad as the ring finger. The internal membrane is longer then the external; for it hath innumerable orbicular, and transverse wrinkles to stay the *chylus*. It beginneth on the right side, under the *colon*, where the *duodenum* endeth, and the guts being to be wreathed, and filling almost the whole umbilical region, it endeth into the *ileum*; of all other guts it hath greatest store of veins and arteries; and by these you may know the circumscription of it. *Meatus biliarius* is inserted into the beginning of this gut, which sendeth choler from the gal, which pricketh the guts to hasten expulsion.

The third is *ileum*; it hath thinner membranes than the rest of the *tenuia*. It is seated under the navel, and filleth both the *Ilia*. It is the longest of all the guts, for in length it containeth 21. hand-breaths; but it is the narrowest of all, for it is but an inch

inch in breadth. It hath fewer wrinkles then the *Jejunum*, and leſſer, which about the end of it ſcarcely appear.

It beginneth where both ſmaller and fewer veins appear, and endeth about the place of the right Kidney, where it is joined both with the *Inteſtinum cæcum*, & *colon*. The external coat of the *tenuia inteſtina* is more thin and fleſhy then the internal. It hath tranſverſe and orbicular fibres, with a few ſtraight to ſtrengthen the tranſverſe. The internal coat it hath partly ſtraight, partly oblique fibres: yet fewer ſtraight then the *craſa inteſtina* have. Theſe guts have a motion ſuch as worms have when they crawl, or leeches when they ſuck, to draw downward the *Chylus*: for it is not in our power to ſend this away, as we do the excrements. The *craſſa inteſtina* have not this motion and by reaſon of this motion the upper part of the gut may be wrapped in the lower, which cauſeth the ſickneſs called *ileos*, or *convolvulus*. Now

Now follow the *inteſtina craſſa*, the great guts; they are three in number alſo.

1. The firſt is called *cæcum τυφλὸν*, the blind gut, becauſe one end of it is ſhut, ſo that at the ſame orifice the *chylus* paſſeth, and returneth. In man it is like a thick round worm coiled together. It is bigger in an infant than in a man; four inches in length, and one in breadth. It is not tied to the *meſenterium*; but being couched round, it is tied to the right kidney. In ſound perſons it is alwaies empty. In four-footed beaſts it is alwaies full of excrements. Apes have it larger then a man, Dogs larger than Apes; but Conies, Squirrels and Rats largeſt of all, if you conſider the proportion of their bodies.

2. The ſecond is *colon*, *κῶλον παρὰ τὸ κωλύειν*, becauſe it detaineth the excrements: it hath its beginning from *ileum & cæcum*, and mounting up by the *dextrum illium*, when it comes to the liver, it paſſeth tranſverſly under the ſtomack of the

the left *illium*, and from thence to the beginning of *os ſacrum*.

It is tied for the right kidney in the right ſide, by the external membrane; then in the middle to the bottom of the ſtomack, and at the laſt under the left kidney. In length, it is of ſeven handbreadth and ſeven inches. It is the broadeſt of all others that it might contain all the excrement.

It hath cells which ſpring from the internal tunicle of it: Theſe cells are kept in the figure by a ligament half an inch broad, which paſſeth through the upper and middle part of it all alongſt; this being broken or diſſolved, the cels appear no more. The uſe is to hinder the flowing of the excrements in one place, which would compreſs the parts adjacent.

It hath a valve where it is joined with *ilium*, like to the *Sigmoides* in the *Sinus* of the heart. This valve ſo ſtoppeth the hole which is common to the *ileon* and *colon*, that flatuoſity cannot aſcend to the *ilium*, much leſs excrements

regurgitate. If one would find this out, let him pour in water into the *Inteſtinum rectum*, and hold up the guts: The waters will ſtay when it comes to the valve, if it be ſound. If this valve be relaxed by ſickneſs, excrements may regurgitate; & expelled by vomit & clyſters, alſo come to the ſtomack.

3. The third is *inteſtinum rectum*, the ſtreight gut; it hath its beginning where the *colon* endeth, and endeth where it maketh the *anus*: it is of a ſpan in length, not ſo wide as the *colon*, the muſcle σφιγκτὴς is at the end of it: It hath thick and fleſhy external coats, and ſo a ſolution of unity in it may the ſooner be united. It hath many tranſverſe fibres, few oblique, and ſome ſtreight. It hath veins not from *Porta* only as the reſt; but from the trunk of the *Cava* deſcending alſo, which make the external Hemorrhoidal.

The guts have a threefold uſe: for firſt, they all concoct the *chylus* ſent from the ſtomack better.

Se-

Secondly, the ſmall guts digeſt the *chylus*.

Thirdly, the thick guts expel the excrements.

CHAP. IX.

Of the Meſenterium.

THE ſubſtance is membranous; Firſt, that it might be light, and ſhould not preſs together the veſſel by its weights: Secondly, that it might be extended into all dimenſions, by reaſon of the fibres: Thirdly, that between the membranes it might the more readily gather fat.

It is of a circular figure, which is moſt capable, that it might anſwer the length of the guts, and keep them within a ſmall compaſs and place likewiſe.

It is framed of two proper membranes, one above another, ſtrong enough; and one common, between which and the proper, the veſſels paſs ſafely to the guts.

The veins are called *Meſaraicæ*,

these spring from *ramus mesentericus, dexter & sinister*, branches of the *vena porta*.

It hath also two arteries, the one superiour, the other inferiour, branches of the *arteria mesenterica*, which pass as the veins do.

As for the nerves, it hath two on each side; springing from the branches of the sixth pair, which go to the roots of the ribs; others it hath from those which spring from the *spinalis medulla*, between the first, second, third and fourth *vertebræ* of the loins.

Glandules. That the vessels might pass safely without ruption, Nature hath placed glandules between the divarications of the veins and arteries.

The biggest. The biggest of these is about the center of the *mesaræum*, where the distribution of the vessels beginneth.

If this become scirrhous, the extenuation of the whole body ensueth, because the passing of the *Chylus* is hindred: lean persons have larger glandules than

th

the fat, because the fat doth sufficiently guard the distribution of the vessels, and preserveth the heat of the vessels.

The arteries bring spirit: but the veins do bring both the *Chylus* to the liver, and nourishment to the inner parts; but not at the same time: As we take breath by, and let it out by the same instruments, but not at the same time: see *Galen. 2. facul. nat. 13. & 4. de us. part. 14.* So at one time the liver draweth from the belly, and at another time the belly from the liver. When the guts are full, the *Chylus* is sent to the liver; but when they are empty, they draw nourishment.

It hath two parts, *Mesaraeum*, μισάεγιον ὅτι μίσον τῆς ἀεγίων ἐντέρων ἐστὶ, and μίσεκῶλον, *quasi* μέσον τῶν κώλων: The first tieth the small guts together; the second the thick.

The *Mesaraeum* is in the circumference three yards, but a span in breth. *The bigness of the Mesaraeum.*

It springeth from the ligaments

Its beginning.

of the *vertebræ* of the loins, by two roots, the largeſt about the firſt *vertebra*; the other leſſer about the third. It was fit that it ſhould be tied ſtrongly to theſe ligament, leſt it might have been torn by violent motions, or be pulled from thence by the weight of the guts being full.

And as plants draw their nouriſhment by their roots from the earth, ſo living creatures which have blood, draw their nutriment from the guts, by the meſaraick veins. Wherefore leſt they ſhould ſuffer ruption, Nature would have them to paſs ſafely between membranes.

The uſe of it then is to carry ſafely the veſſels which paſs to the guts.

It is tied before to the ſmall guts; but behind to the firſt and third *vertebræ* of the loins from whence it ſpringeth.

It is called μεσέντεριον, & μεσέντερον, *quaſi* μέσον τῆς ἐντέρων.

Meſocolon.

Μεσοκῶλον is that by the which the thick guts are tied together. *Hippoc.*

Hippoc. 6. Epid. & Galen. 4. Aphor. 6. make mention of this. It is tied in the right ſide to the right part of the *ileum*; but in the left ſide to the left part of the *ileum*, and the muſcle *pſoas*: before it is tied to the *colon*, *& rectum inteſtinum*.

CHAP. X.

Of the Vena lactea.

THis is the opinion of all the ancient and modern Writers, concerning the meſentery, and the meſeraical, if you except *Caſpar Aſellius*, who by his diligence found theſe veins, which he calleth *lacteas*, becauſe they contain a white juice, which is nothing elſe but the *chylus* elaborate, which they carry from the ſmall guts to the liver. *Why ſo called.*

Their beginning ſeemeth to be in the *Pancreas*, for there they all meet, and are ſtrangely implicate any twiſted together: from whence they paſs upward to the *Their beginning.*

liver, and downward to the ſmall guts: ſo that the *Pancreas* is a more excellent part than it hath been hitherto taken by other Anatomiſts: and as the mothers blood before it be ſent by the *vaſa umbilicalia*, to nouriſh the infant, is firſt committed to the *placenta uteri*; to draw from it all impurity: ſo then theſe *venæ lacteæ* diſcharge their impurities, before they carry the *chylus* to the liver in the *Pancreas*.

Their inferior. They are inſerted into the ſmall guts, and have nothing to do with the ſtomach. They paſs into the capacity of the guts, and end in the wrinkled cruſt, with the which the internal membrane of the guts is lined, with their ſpongious heads like to Leeches, by which they draw to themſelves the *chylus*.

Their progreſs. From the ſmall guts, they march between the two membranes of the *meſenterium*, ſometimes ſevered from the other veſſels, ſometimes joined with them, ſometimes directly, ſometimes over-

over-riding them, making a St. *Andrews* croſs through the *glandules*, until they come to the *Pancreas*, where they are inexplicably twiſted one with another: from thence having greater branches they paſs by the ſides of *vena portæ* to the cavity of the liver, where they are ſpent by ending there by ſmall twiſts: and ſo it is moſt likely that ſanguification is performed by the ſubſtance of the liver, and not by the veins: the groſſer part of it being ſent to the branches of *vena portæ*, and the ſubtileſt to the branches of *vena cava*.

The differnece between them and the ordinary meſaraical veins.

They differ from the ordinary meſaraical veins;

Firſt, in bigneſs: for theſe are bigger, but thoſe are more in number; for they are twice as many: for more *chylus* muſt be ſent to the liver to make blood of, for the nouriſhment of the whole body than blood for the nouriſhing of the inward parts onely.

Their valves.

Secondly, the valves which are ſeen about the endings of theſe

are placed from without inwards, but of these from within outwards. The reason of this diversity is this: the *venæ lacteæ* suck the *chylus* from the guts, which ought not to return; but the ordinary mesaraical send blood, and sometimes excrementitious humours, which ought not to come back again.

How to find them out.

If you would find out these veins, you must feed a dog with milk, and five or six hours afterward dissect his belly; then by stretching the mesentery you shall perceive them.

Why the Ancients did not find these out.

That the Antients did not find out these veins, the cause is, either because they dissected beasts after they were dead, or after that the *chylus* was distributed, or they did not presently take a view of the mesentery; but made some stay about the inspection of some other part.

Why they have no trunck.

They have no trunck, because they were to end in the liver, and to go no further; from this part many diseases spring: first, because

cauſe it is compoſed of two membranes, having innumerable veins and arteries, and ſo it may contain many impurities: ſecondly, becauſe it hath many glandules, which as a ſponge imbibe ſuperfluities.

CHAP. XI.

Of the Pancreas.

IT is called παγκρέας and χαλικρέας. It is the biggeſt glandule of the whole body, and very red, like unto ſoft fleſh, from whence it hath its name.

In figure it is oval, three or four inches in length. It is placed in the left ſide towards the ſpleen; above the ſtomack reſteth upon it; below, the membranes of the *peritonæum* lie, unto which it is firmly tied; it doth keep within it ſelf *ramus ſplenicus*, the leſt branch of *arteria cœliaca*, the nerves which paſs from the ſixth pair to the ſtomack and the *duodenum*.

It hath a membrane from the *peri-*

peritonæum, by the which it is covered and holden up.

It hath three uſes. Firſt, it ſtayeth the liver, leſt it being diſtended by too much meat and drink, ſhould be hurt by the hardneſs of the *vertebræ* of the back.

Secondly, to keep the veſſels paſſing through it from ruption.

Thirdly, to keep theſe ſame from compreſſion, when the ſtomack is too much ſtretched by meat and drink.

CHAP. XII.

Of the Liver.

Now follow the parts appointed for ſanguification, whereof the Liver is the chiefeſt.

THE ſubſtance of the Liver ſeemeth to be a red fleſhy maſs. In the firſt formation of the birth it is framed of blood wizing out of the veins, and there coagulating about them.

The

The ſubſtance of the liver is ſo ſet about the branches of the *vena porta* and *cava*, that it filleth up all cavities, and doth firmly ſtay them, keeping them open from purſing together, and in comely order, that they be not confounded. It is the thickeſt and heavieſt of all their entrals.

Its bigneſs.

It is bigger in man than any other living creature, if you conſider the proportion of his body; for it was fit ſo to be; ſeeing man was to have the greateſt ſtore of blood, leſt ſpirits ſhould fail in performing the functions of the Soul, wherewith man is moſt copiouſly furniſhed. Beſides, ſeeing he hath but one liver, the bigneſs was to recompence the number: we may gheſs of the bigneſs of it by the bigneſs of the fingers.

It is covered with a very thin membrane, which ſpringeth from the ſecond ligament of the liver, which cleaveth firmly to the ſubſtance of the liver. If it be ſeparate at any time by a watriſh hu-

humour, issuing out of the vessels from the fleshy substance, watrish pustules, by the Græcians called ὑδρόπισις, are ingendered. If these do break, the water falleth into the cavity of the belly, and causeth that kind of dropsy called *ascites*.

Its veins. It hath veins as well from the *cava* as the *porta*.

The branches of the *cava* are distributed for the most part through the gibbous part; but those of the *porta*, into the hollow part: yet so that the branches of both are joined by inosculation to deliver the purest blood to the the *vena cava*, for the nourishment of the vital parts; and the grossest by the branches of the *porta*, for the nourishment of the natural. There seemeth to be three times more of the twigs of the *porta*, than of the *cava*, within the liver.

Amongst the midst of the branches of the *porta*, some little veins march; which afterward becoming one twig, end in the

vesicula

veſicula fellea, that the bilious humay be ſent to it, before the blood enter into the *vena cava*.

It hath only few arteries, which ſpringing from the right branch of the *cœliaca*, end in the hollow part of the liver, where the *vena porta* cometh out. *Its arteries.*

It hath two nerves, but very ſmall, becauſe it hath but a dull ſenſe. One cometh from the branch which is ſent to the upper orifice of the ſtomack, the other from that branch which is diſperſed through the roots of the ribs of the right ſide. *Its nerves.*

As for the figure of it, it is almoſt round, the upper part is arched and ſmooth, and ſo framed, that it might not hurt the *diaphragma*. *Its figure.*

The lower part is hollow to receive the ſtomack, which is of a ſpherical figure.

In the upper and convex part, which is diſtant but one inch from the *diaphragma*, to give way to it when it is dilated in breathing *Its ties.*

ing and to the ſtretching of the ſtomack: it is tied firſt to the *diaphragma*, by a ligament membranous, broad, and ſtrong, which ſpringeth from the *peritonæum*, where it covereth the midriff in the lower part. It paſſeth tranſverſly by the liver, to the hinder parts; by this ligament, it is ſtayed from falling down. It is called the Suſpenſory.

Secondly, in the fore-part it is ſtayed by two ties; by the firſt it is tied to the *mucronata cartilago*, to hinder it from falling to the back parts when we ſtretch our back: this ligament is broad, double, and ſtrong, and ſpringeth from the *Peritonæum*, and giveth the liver its coat. Into this coat the two ſinews are implanted, according to *Galen. lib. 3. de loc. affect. cap. 3.* and not into the ſubſtance of the liuer; ſo that, according to *Galen. 4. de uſ. par. cap. 13.* it hath but a dull feeling, ſuch as plants have to embrace that which is profitable, & to leave that which is unprofitable. By

By the second it is tied to the navel: this is the umbilical vein, which when the Infant is born, looseth its hollowness, and becometh a ligament. This stayeth it from being pulled upwards.

Thirdly, it is tied to the short ribs, by small fibres, to keep it steady. In the hollow part it is tied by the *mesenterium*, to the ribs by the *vena cava*.

Its differences from the Liver of beasts.

It differeth from the liver of beasts, in that it hath seldom any lobes; yet the hollow part of it hath a fissure, or chink, wherein the umbilical vein is implanted, and two small bunchings out in the right part, where the *vena portæ* marcheth out, which *Galen* calleth πύλας, gates.

A little Lobe.

Besides these, there is a little lobe of a softer and thinner substance than is the rest of the liver, and is covered with a membrane: It is tied to the *Omentum* by this lobe, by the which *Spigel. de human. corp. fabric. lib.* 8. *cap.* 12. thinketh that waters may be discharged out of the liver into the caul.

It

Its situation. It is placed in the lower belly, in the right side, covered with the ribs for safety, and in the middle of the truncke of the body, to send blood equally to the upper and lower parts. The stomack is cherished by it, and the spleen; but because it is a more noble part than the spleen, it is placed in the right *hypochondrium*.

Its action The proper action of it is not onely to further sanguification, perfected in the veins, as all ancient Anatomists averr; but to sangnifie the *chylus*, carried to it by *venæ lacteæ*, as *Aselius* hath proved.

A note. One thing is to be noted, that the substance of the liver, in the convex part, where the *vena cava* is lodged, is softer then that which is in the hollow part, where the *vena portæ* is: for there it may be more easily separate from the vessels, than here; and not without cause: for the roots of *vena portæ* ought to be stayed by a harder substance, that they be kept wider; but the roots of the *cava* with

with a ſofter, that they might the readier be filled, ſtretched, and ſlacked.

CHAP. XIII.

Of the vena porta.

SEeing the roots of the veins which Nature hath appointed to furniſh blood, the nutriment of the body, have their roots in the liver: having diſcourſed of it, method doth require to ſet down the doctrine of them.

The veins of it.

Although there is but one artery to impart life, yet there are two veins, the *vena portæ* and *cava*. Becauſe ſome require a groſſer blood for nutrition, as thoſe parts are which ſerve, the liver, the gal, the ſtomack, the ſpleen, the *Pancreas*, the *omentum*, the gut, and the meſentery. For unto the reſt, as the kidneys, bladder and thoſe which are appointed for procreation, the *vena cava* ſendeth branches.

Vena portæ.

It is fit to begin with the *vena porta*,

porta, becauſe it goeth no further then to the parts, contained in the abdomen, and not to all thoſe neither.

Why ſo called.

It is ſo called, becauſe it ſeemeth to enter into the liver by the two fleſhy bunches called *porta*, gates.

How it differeth from Vena cava.

This doth differ from the *vena cava*.

Firſt, in ſubſtance; for the ſubſtance of this is thicker and blacker, becauſe it is nouriſhed with thick and black blood; but that of the *vena cava* is whiter & thinner, becauſe it is nouriſhed with a thinner and redder blood.

Secondly, the ſubſtance of the *vena porta* is harder then that of the *cava*; which ought to be ſofter, becauſe it ought to be more apt for dilatation and conſtriction; firſt, becauſe it containeth a more moveable blood; partly becauſe it is thinner, having much ſeroſity mingled with it; partly, becauſe for the moſt part the branches of it are accompanied with the branches of

of the great artery, wheas the branches of the *porta* are farre enough off, if you except *ramus splenicus*.

Thirdly, the trunk of *vena cava* is larger then that of *porta*, because it nourisheth more parts, as hath been said.

Fourthly, the *porta* hath more roots within the substance of the liver than the *cava*.

The roots of the *vena porta* and *cava* are joined by the unition called *anastomasis*, or inosculation. This is performed by two wayes; First, when the ending of one doth meet with the end of the other; as the *epigastrica vena* meet with the *mammaria* in the lower side of the *musculi recti*. *How inosculation is performed.*

Secondly, when one branch resting upon another, does cleave together, having a hole in the middle; this inosculation is seen in the roots of the *vena porta*, and the *cava*.

One thing is to be noted, that there are many of the twigs of the *vena porta* which touch not those *A Note.*

two of these twigs, from whence some call them *cystica gemella*: but this is matter of no great moment. This twig may be called *furculus cysticus*, or *vesicalis*.

The second twig is bigger, but lower. This springeth from this same forepart, yet towards the right side, and is inserted into the bottom of the stomack: from hence it sendeth many sprigs toward the hinder-part of it, towards the back.

It may be called *Pistoricus*, more properly then *Gastricus*, seeing there are other branches, which are called *Gastrici*. Having sent forth those two twigs, the trunck passeth down, and binding still a little towards the left side, it is parted into two remarkable branches; whereof the one is called *sinister*, or the left, seated above the right, but lesser: the other is *dexter*, or the right, lower then the left, yet larger: the left is bestowed upon the stomack, the *omentum*, a part of colon, and the spleen: the right

is

is spred through the guts, and the *mesenterium*; the left is called *vena splenica*, but the right, *vena mesenterica*.

The *vena splenica* hath two branches before it come to the spleen, the superiour and the inferiour. *Branches of* Vena splenica.

The superiour is called *gastricus*, or *ventricularis*. This is bestowed upon the stomack; the middle twig compassing the left part of the orifice of the stomack like a garland, is called *coronaria*; from the lower branch two twigs do spring, the one is small; this doth send other twigs to the right side of the lower membrane of the *omentum* and to the colon annexed to it. This is called *epiplois*, or *omentalis dextra*; the other is spent upon the lower membrane of the *omentum*, which tieth the colon to the back, and upon that part of the colon it is called *epiplois*, or *omentalis postica*: when the *ramus splenicus* hath approached to the spleen, it doth send out two other twigs, the uppermost and the

thole of the *cava*; becauſe the pureſt part of the blood was only to be carried to the *vena cava*, and the thickeſt to remain in the *vena portæ*. By reaſon of theſe *Anaſtomaſes* in famine nouriſhment in ſent from the habit of the body by the *vena cava*, to nouriſh the internal parts.

Bauhin affirmeth, that there is a common conduit to the roots of *vena portæ* and *cava*, which in its cavity will receive a ſmall probe. In theſe veins, beſide blood, excrementious humours are alſo contained in diſeaſed perſons, which ſometimes are ſent from the whole body by the *vena cava* into the guts, and ſometimes communicate to the *vena cava* by *vena portæ*.

How the inoſculation of theſe veins is found out.

To find out the radication and inoſculation of theſe veins, you muſt boil the liver untill it become ſoft, and ſo with a woodden or bone knife ſeparate the ſubſtance from the veſſels; for a ſharp knife is not fit.

Now to come to diſtribution of

vena

vena portæ, it hath parts: 1. *Radices*, the roots. 2. *Truncus*, the trunck. 3. *Rami*, the branches. 4. *Surculi*, twigs. *The distribution of Vena portæ.*

As for the roots first from the circumference of the liver small capillar veins march toward the inner part of it, and by combination becoming greater, they make up five branches. These about the middle of the hollow part, yet towards the back joining together, make up one root, which at the last coming out of the liver, about the eminences, called *portæ*, frame that trunck which is called *vena portæ*. *Its roots.*

This trunck parting a little from the liver, before it be severed into branches, it puts forth two wigs; the one being not small and springing from the upper and forepart of the trunck, as soon as it parteth from the liver, is inserted into *Cystis fellis*, about the neck of it, and spread by innumerable twigs, through the external coat of it. *Its branches*

Vesalius affirmeth, that there be two

two of these twigs, from whence some call them *cystica gemella*: but this is matter of no great moment. This twig may be called *furculus cysticus*, or *vesicalis*.

The second twig is bigger, but lower. This springeth from this same forepart, yet towards the right side, and is inserted into the bottom of the stomack: from hence it sendeth many sprigs toward the hinder-part of it, towards the back.

It may be called *Pistoricus*, more properly then *Gastricus*, seeing there are other branches, which are called *Gastrici*. Having sent forth those two twigs, the trunck passeth down, and binding still a little towards the left side, it is parted into two remarkable branches; whereof the one is called *sinister*, or the left, seated above the right, but lesser: the other is *dexter*, or the right, lower then the left, yet larger: the left is bestowed upon the stomack, the *omentum*, a part of colon, and the spleen: the right

is

is ſpred through the guts, and the *meſenterium*; the left is called *vena ſplenica*, but the right, *vena meſenterica*.

Branches of Vena ſplenica.

The *vena ſplenica* hath two branches before it come to the ſpleen, the ſuperiour and the inferiour.

The ſuperiour is called *gaſtricus*, or *ventricularis*. This is beſtowed upon the ſtomack; the middle twig compaſſing the left part of the orifice of the ſtomack like a garland, is called *coronaria*; from the lower branch two twigs do ſpring, the one is ſmall; this doth ſend other twigs to the right ſide of the lower membrane of the *omentum* and to the colon annexed to it. This is called *epiplois*, or *omentalis dextra*; the other is ſpent upon the lower membrane of the *omentum*, which tieth the colon to the back, and upon that part of the colon it is called *epiplois*, or *omentalis poſtica*: when the *ramus ſplenicus* hath approached to the ſpleen, it doth ſend out two other twigs, the uppermoſt and the

lowermoſt: from the uppermoſt *vas breve* ſpringeth, which is implanted in the left part of the bottom of the ſtomack commonly: from the lowermoſt two twigs iſſued,

The firſt is called *gaſtroe piploi ſiniſtra*, this coming from the lower part of the ſpleen towards the right ſide, is beſtowed upon the left part of the bottom of the ſtomack, and the upper and left part of the *omentum*.

The ſecond ſpringeth moſt commonly from *ramus ſplenicus*, but ſeldom from the ſpleen; and paſſing along according to the length of the *inteſtinum rectum*, it is inſerted into the *anus*, by many twigs. This is called *Hæmorrhoidalis interna*, as that which ſpringeth from the *vena cava* is called *hæmorrhoidalis externa*.

Vena Meſenterica.

Now followeth *vena Meſenterica*, or the right branch of *vena portæ*; before it be be devided into branches, it ſendeth forth two twigs.

The firſt is called *gaſtroepiploi ſiniſtra*

sinistra, this is bestowed upon the right part of the bottom of the stomack, and the upper membrane of the caule.

The second is called *intestinalis*, or *duodena*: It is inserted into the middle of the *duodenum*, & the beginning of the *jejunum*, and passeth according to the length of them. This branch, as soon as it passeth from the back, it entereth into the *mesenterium*, and passing between the membranes of it sendeth forth those meseraical veins, which send nourishment to the inward parts.

It is divided into two branches, to wit *Mesenterica dextra*, & *sinistra*: *Mesenterica dextra*, placed in the right side, sendeth a number of branches to feed the *jejunum cœcum*, and the right part of the *colon*, which is next to the kidney and liver.

It hath fourteen remarkable branches, but innumerable small twigs. One thing is to be noted, that the greater branches are supported by the greater glandules, and the smaller by the smaller

glandules. *Meſenericus ſiniſter* paſſeth through the middle of the *meſenterium*, and that part of *colon* which paſſeth from the left part of the ſtomack, to the *inteſtinum rectum*.

Its uſes. The chief uſe of the *vena porta* is, to nouriſh the parts which are appointed for nutrition, with thick, and feculent blood: It ought to be thick, that it might be the hotter; for heat in a thick body is more powerfull.

The ſecond uſe is to further the ſanguification of the liver.

CHAP. XV.

Of the Vena cava diſperſed within the trunk of the body.

WIthin the trunk of the body, the *vena cava* hath two trunks; one called *aſcendens* or going up, the other *deſcendens* marching down.

The *aſcendens* paſſing through the nerves, part of the *Diaphragma*

it marcheth upward undivided, until it come to the *jugulum*: yet by the way from its side it sendeth two twigs.

Its sprigs

The first is *Phrenica*; this is inserted into the Middriff and heart; from hence springeth the *coronaria vena* which compasseth the basis of the heart as a garland. 1.

The second is *vena sine pari*, so called, because it hath not a fellow in the left side, as other veins have. It doth spring about the *vertebra* of the breast, from the hinder part of the *vena cava*, in the right side. 2.

This going down, it marcheth towards the *Spina*: when it is come to the eighth or ninth rib above the *Spina*, it is divided into two branches, to wit, the right, & the left; the left is inserted most commonly in the middle of the left emulgent vein. By this branch, blood, or wateriſh or purulent matter may be discharged by urine; the right twig is implanted either into the trunk of the *cava*, or into *prima lumbaris*.

The branches of Vena sine pari

This being done, the *vena cava*

ascendeth up to the *Jugulum*, being strengthened by the *Mediastinum*, and the glandulous body called *Thymus*. Here the *Vena cava* is divided into two remarkable branches, from whence those veins spring which are sent to the head, to the arms, and some muscles of the *abdomen*. One passeth to the right side, the other to the left; the one is called *subclavius* because it marcheth under the cannel bone within. The other is called *axillarius*, when it is come to the arm-pit; from the upper part of the *Ramus subclavius* two remarkable branches proceed: the internal and external jugular; in man the internall is biggest, but in beasts the external.

The branches of Ramus subclavius.

The internall jugular cometh out about the articulation of the cannel-bone with the *Sternum*; then it joyneth it self with the soporall artery, and the recurrent nerve? and with its hinder and greatest branch, accompanied with the soporal artery it entereth with the *cranium* at the hole of the

the *occiput*, by the which the sixth pair of nerves cometh down, it entreth into the first and second *sinus* of the *dura mater*.

The external jugular mounteth up to the eare under the skin, and the quadrat muscle which pulleth down the cheek alongst the neck: from this branch spring the veins wch are opened under the tongue. 2.

From the lower part of *ramus subclavius*, spring great branches. *Strings springing from the lower part of* Ramus subclavius.

The first, *Intercostalis superior*, one on each side; it is small, and cometh out about the root of the bifurcation: then passing down by the roots of two ribs, it bestoweth twigs upon the distances of these two ribs.

The second is *Mammaria*, this marcheth forwards towards the upper part of the breast bone: then it goeth down by the sides of it, and when it is come to *cartilago mucronata* about the sides of it, it cometh out: from thence it passeth straight ways under the right muscle to the navell, where by an *anastomasis* it is joyned with the epi-

epigastrica ascendens: from hence cometh that great consent between the matrix and paps.

The third is *Mediastina*, because it is bestowed upon the *medeastinum* together with the left nerve of the *diafragma*, according to its length.

The fourth is *Cervicalis*, or *Vertebralis*. This passing through the holes of the tranverse processes of the *vertebræ* of the neck, is bestowed upon the muscles of the neck which are next to the *vertebræ*.

CHAP. XVI.

Of the Gall.

The description of it.

THe Gall, called in Latine *vesica biliaria*, or *Folliculus fellis*, is a dissimilary part, in figure representing a pear, hollow and appointed to receive the thin yellow choler.

It is about two inches in length.

By its upper part it is tied to the

the liver, which doth afford it a hollowneſſe to receive it; but the lower part which hangeth without the liver, it reſteth upon the right ſide of the ſtomack, and the *colon*, and doth often die them both yellow.

Its bigneſſe. Its connexion.

It hath two membranes, the one common, which is thin and exterior, without *fibres*. This ſpringing from the membrane of the liver, it only covereth that part which hangeth without the liver; The other membrane is proper.

Its membranes.

This is thick and ſtrong, and hath three ſorts of Fibres, the outtermoſt are tranſverſe, the middlemoſt oblique, and the innermoſt ſtraight.

The fibres of the proper membrane.

This membrane is harder and thicker in the neck; but thinner in the bottom. Within, it hath a mucous ſubſtance, engendred of the Excrements of the third concoction of the membrane to withſtand the acrimony of the choler.

The parts of it.

It hath two parts, the neck and the bottom.

The neck is harder than the bottom, and higher in situation.

It from the bottom by degrees growing narrower and narrower, at last endeth in the *Ductus communis*, or the common passage of the choler, to the beginning of the *Jejunum*.

This elongation of the neck of the *visecula fellea*, is called *meatus cysticus*, because it springeth from the *Cystis*.

How the choler is carried to the gall

The choler is carried to the neck of the *Cystis* by many small veins, near to the roots of the *vena porta* about the midst of them, and is discharged into the cavity of it about the upper part.

Its valves.

The *meatus cysticus* hath three valves; looking from without inwards to hinder the recourse of the choler to the Liver.

Meatus hepaticus

The other passage which carrieth the thick and corrupt choler, as that which is called *vitellina arumnosa, porracea, &c.* Is called *meatus hepaticus*; because it passeth straight away from the Liver to the *ductus communis*.

This

This paſſage hath no Valves; both theſe diſcharge their choler by the common paſſage into the beginning of the *Jejunum*, when the ſmall guts are diſcharged of the *Chylus*.

Beaſts which want the *veſica fellea*, have this *meatus hepaticus*, as Harts, Hynds, & fallow Deer, and thoſe which have a whole hoof.

What beaſts have this paſſage onely.

The *Meatus hepaticus* paſſeth thorow the roots of the *vena cava*, by innumerable branches, which being gathered together become one branch; and being united with the *meatus Cyſticus* make up the *communis ductus*, which is inſerted into the beginning of the *jejunum* obliquely, between the two membranes of the inteſtine, about the diſtance of two inches, before it perforate the ſecond membrane.

The *veſica fellea* hath for nouriſhment called *Cyſtica gemella*.

For life it hath ſprigs of arteries proceeding from the *Caliaca*. To afford ſenſe, it hath a ſmall threed like a ſprig of a ſinew from the ſixth pair.

Its veſſels.

Many

Of the ſtones in it.

Many times ſtones are found in it, but they being lighter then thoſe of the bladder, ſwim above the water.

The uſe of the paſſages. The uſes of the choler.

The uſe of theſe two paſſages, is to draw all ſuperfluous choler from the *chylus*, and to return it into the guts, where it affordeth benefits to nature:

1. For firſt by its ſharpneſſe it moveth the inteſtines to turn out the terreſtrial excrements in due ſeaſon.

2. Secondly, by reaſon of its thinneſſe it doth cut and cleanſe the ſmall guts of flegm, which there is plentifully bred.

3. Thirdly, by reaſon of its drineſſe it hindereth the increaſe of putrefaction.

4. *Why choler is not carried to the ſtomack.*

Fourthly, it furthereth concoction in the inteſtines by encreaſing their heat: neverteleſſe, naturally there can be no paſſage to carry choler to the bottom of the ſtomack.

1. For firſt, by reaſon of its acrimony it would corrode it.

2. Secondly, it would cauſe the crude

crude nourishment to passe into the *duodenum*.

Thirdly, it would procure perpetuall vomiting. If it fall out that choler be carried to the bottom of the stomack by any passage then this the party vomiteth choler, and is termed πικρόχολος ἄνω, but if it be inserted into the end of the *jejunum*, then bilious dejections follow: and such a one is termed πικρόχολος κάτω. 3.

One thing I would have you observe; that the *porus biliarius* passeth by a straight course to the *ductus communis*, and not to the *vesicula fellea*, which thus you may show: put a *catheter* into the neck of this passage near the liver, the guts will be blown up, and not the *vesicula*. Again, put the *catheter* into the common passage, and both the *cystis fellis*, and the *meatus cholidecus* will be blown up. *A note.*

If you would finde out the three valves of the *vesicula fellea*, press the choler with your fingers from the bottom towards the neck; *How the valvs are found out.*

neck; where you find the choler to ſtay, there the valves are.

CHAP. XVI.

Of the ſpleen.

THe ſpleen or Milt in Engliſh, in Greek is called *Splen*, and *Lien* in Latin.

Its ſubſtance. The ſubſtance of it is flaggy, looſe and ſpungeous, net-like, which is the cauſe that it might imbibe much ſuperfluity, and ſo become exceedingly ſwelled.

Its membrane. This ſubſtance is covered with a membrane borrowed from the *Peritonæum*, which is inſerted firſt into the ſtraight line of the Milt, and then covereth the whole ſpleen: It is thicker then that of the liver. Firſt, becauſe it hath a looſer ſubſtance. Secondly, becauſe it hath more arteries, which require a ſtrong membrane to defend them. The ſtraight line is in the hollow part where the veſſels of the Spleen do enter into it.

In

In infants new born it is of a red colour, because they have been fed with eleborate blood; but in those of a ripe age it is somewhat blackish: being boiled it representeth claret wine. In man it is bigger, thicker, and heavier, then the beasts; for it is six inches in length, three in breadth & one in thickness; yet according to *Arist.* 3. *hist. Animal.* 6. a convenient little one is better then a big one.

Why it is red in Infants.

In figure it is somewhat long, like an Oxes tongue

Its figure

It is seated in the left *hypochondrium*: so *Hippocrat.* 6. *Epidem.* calleth it the left liver; and *Aristot.* 3. *part. animal.* 7. the bastard liver, but it is seated somwhat lower, because it was to draw the terrestrial part of the *Chylus*, before it come to the liver by *ramus splenicus*, that the blood may be made thinner and purer; for such blood causeth men to be wiser, 2. *de part. anim.* 2. it is touched within and under the short ribs; so that in healthfull persons it cannot be felt; onely if it be inflamed, a pulsation may be felt.

Its situation.

It

Its connexion.

It is tyed to five parts; to the midriff and left kidney by ſmall membranes, by its hollow part which giveth way to the ſtomack, being diſtended to the upper membrane of the *omentum*, and to the ſtomack by *vas breve*. In its arched part it is tied to the back, ſo that dints remain in it by the impreſſion of the ribs.

Its veſſels.

It hath veins for nouriſtment from *ramus ſplenicus*; for life it hath arteries from *ramus cœliacus ſiniſter*; but five times more than veins, for great heat is required for the elaboration of thick blood. Theſe veſſels enter into the ſpleen where the ſtreight line is in the hollow ſide. They joyn often by *an aſtomaſes*.

The uſes of the arteries of the ſpleen

1. The arteries beſides life afford unto the the ſpleen two benefits.

First, they increaſe the naturall heat of it, that it may the better concoct the groſſer part of the *Chylus*, which is ſent unto it by the *ramus ſplenicus*.

2. Secondly, they further the expulſive faculty of it.

Now

Now the ſpleen ſendeth its ſuperfluities to the kidneys by two ways.

By what ways the Spleen ſendeth its ſuperfluities to the Kidneyes.

Firſt, by returning of them by *ramus ſplenicus* to the *vena porta*, and from thence to *vena cava*, from whence they are ſent to the emulgent veins. 1.

Secondly, by a ſhorter paſſage they are ſent from *arteria caliaca* to the *aorta*, and from thence to the kidneys by the emulgent arteries. 2.

Laſt of all, it hath ſmall twigs of nerves from the ſixth pair, which are beſtowed upon the inveſting membrane, but are not communicate to the ſubſtance: wherefore it muſt be but of a ſmal and dull feeling: ſo that the pains which ſundry aſcribe to the ſpleen, are to be referred to the adjacent parts.

The uſe of the Spleen.

The uſe of the ſpleen, as alſo of the liver, is to further the elaboration of the concoction of the *Chylus:* for it is a baſtard liver, according to *Ariſt.* 3. *de Hiſtor. animal.* 7.

The

How the sanguification of the spleen differeth from that of the Liver.

The sanguification of the spleen differeth in two points from that of the liver.

First, in the material cause; for the spleen maketh grosse blood of the more earthly part of the *Chylus*; but the liver far purer of the thinner and more benigne part of the *Chylus*.

2. Secondly, it differeth in the finall cause; for the liver sanguifieth to afford nourishment both to the vitall and animall parts; but the spleen onely to maintain the naturall parts, and not all of them neither.

Why the naturall parts are nourished with grosse blood.

Nature would have the naturall parts to be furnished with grosse blood by the branches of *vena portæ*, partly to encrease their heat; for heat in a thick body is stronger; partly to afford them nourishment answerable to their substance, for it is thick.

Of

Of the kidneyes.

CHAP. XVII.

THe kidney is called in Latin *Ren*, from ῥέω to flow; because the serosity of the blood doth flow through the kidneys to the ureters, and from thence to the bladder. *Their denomination.*

They are in number two, not so much for the posing of the body, as for their use and necessity; that one being stopped, yet the cleansing of the blood might be performed by the other. *Their number.*

They are seated in the loynes under the liver and spleen, and rest upon the muscles called φόαι, which move the theyght about their head under the which large nerves are touched. Which is the cause that a big stone being in the kidney, a numnesse is felt in the foot of this side the muscle φόα being pressed down by it: They lie behind the guts. The right kidney hath the *cacum*, but the left *Their places.*

the

the *colon* above it: in man the right kidney is loweſt, by reaſon of the greatneſs of the liver, and bigger alſo then the leſt, yet it is not ſo fat as the left, by reaſon of the vicinity of the liver; whoſe heat hindereth the encreaſe of fat.

Their figure.

In figure they reſemble the *aſarum* leaf or kidney bean: towards the loyn they are gibbous, but hollow towards the guts.

Their connexion.

As for their connexion, by the externall fat membrane they are tied to the *diaphragma*, and the loyns; by the emulgent veſſels of [illegible] and the *vena*, and by the ureters to the bladder.

Their bigneſſe.

They are in length about five inches, in breadth three, and in thickneſſe one; yet they are ſomewhat broader above then under. They are ſmooth in the gibbous part, unequal in the hollow part, to let in & out ſome veſſels.

Their parts.

The parts are two, to wit the the external and the internal; the external are the membranes; theſe are two.

The one is common and exter-

nall

nal, borrowed from the *Peritonæum*; within the reduplication of which the whole Kidney is lapped; & therefore it is called *Renis fascia*. This membrane is compassed with copious fat; so that the Kidney seemeth to be the fattest of all other intrals, according to *Arist.* 3. *Hist. animal.* 17. Although each one be exceedingly fat, yet some part of the Kidney will remain uncovered about the middle.

Their membranes.

This fat about the Kidney hath a threefold use. First, it is instead of a pillow.

The uses of the fat of the kidneys.

Secondly, it receiveth as a sponge the excrements.

Thirdly, it furthereth and keepeth in the heat.

Before you deprive the kidneys of this *tunica adiposa* with your nails, about the upper part of the kidney, you are to observe a large glandule, which hath a sprig from the emulgent vein and artery, for nourishment about the middle of it.

Renis succenturiati *Their figure.*

In figure it representeth a half moon

moon and is not unlike a kidney; from whence it is called *ren succenturiatus*. There is one on each side in the upper part of the kidney, resting upon the *tunica adiposa*.

Their connexion.

It is strongly tied to the *septum transversum*.

The substance of it is more flaggy then that of the kidney.

Their Nerves.

It hath nerves from the *plexus retiformis*, or net like texture, framed of the twigs of the *nervus costalis* and *stomachicus*.

Its use.

It seemeth to be framed, partly to fill up the vacuity which is between the kidneyes and the *diaphragma*; partly to be a pillow to the stomack, in the place about the emulgent vein and artery.

The proper membrane of the kidneyes.

The second membrane is that which is internall and proper. This springeth from the common coat of the vessels which enter into the Kidneys: for as soon as the vessels approach to the Kidney, they leave their external coat. It can hardly be separate from the substance of the Kidney.

The

The internall parts are those which are contained within the proper membrane. in these sundry things are remarkable.

Their internall parts.

First, the colour of the Kidney, which is very red.

The colour of them.

Secondly, the substance of the Kidney, which is thick, hard, and compact as the heart almost, but not so fibrous.

Their substance

Thirdly, the description of the emulgent vessels throughout it; first, they enter by pairs into the hollow part of the kidney; then each branch is devided into four or five lesser branches, and they again into lesser, until at the last they become capillar.

The emulgent vessels.

These being spred sundry ways through the substance of the kidney, towards the gibbous part, at last they end at the tops of the *Caruncul papillares*, or teat-like fleshy substances, into the which they pour the serosity of the blood, that it may pass through the *tubuli*, or water pipes to the *infundibulum*.

The fourth is that which is called

called *pelvis*, or *infundibulum*, the tunnel which is nothing else but the ample cavity of the ureter within the kidney.

Fifthly, the *tubuli*, or *fistulæ ureterum*, the water pipes of the ureters offer themselves, which are most commonly in number ten: four in each end, two being still joyned together, and two in the middle, according to the number of the *carunculi papillares*. These are placed in the arched part of the *infundibulum*. Now the ends of the pipes about the *infundibulum* are called *cribrum*, or, the sieve. These water pipes, proceeding from the *infundibulum*, become a little wider, and end in the gibbous part of the kidney, with a wide round mouth receiving the *caruncula papillares* by the which their mouths are stopped, and the wateriſhness of the blood issueth out into them, as milk out of the teats.

Sixthly, *Caruncula papillares* are to be considered. They are small fleshy bodies, somewhat harder than

than the ſubſtance of the kidney, reſembling the teats of womens paps, from whence they have their denomination; they are of the bigneſſe of a peaſe, ſomewhat broad above, below round. If you divide them through the middle, you ſhall perceive a ſmooth hairlike paſſage from the top to the end.

They are in number anſwerable to the number of the *tubuli*, which receive them.

How these parts are to be found out.

To find out theſe parts before named, you muſt divide the kidney in the hollow part putting a thick probe into the *pelvis*.

Inciſion being made to the *infundibulum*, firſt you ſhall ſee the *tubuli*, then the *Caruncula papillares*.

Their Veins.

The kidneys have two ſorts of veins.

Firſt, the two called *adipoſa*, becauſe they are ſpred through the *tunica adeposa*, and are covered with the fat, and afford matter for the fat. The right of theſe ſpringeth from the emulgent

vein; but the left from the *vena cava*.

Secondly, the two *emulgentes*, so called from their action. These are large and spring from the trunck of the *vena cava*, descending between the first and second *vertebræ* of the loyns. These being carried transversly, are implanted into the hollow part of the kidneys, being divided into two branches.

The left is somewhat higher, as also the left kidney; but the right is some what longer. It hath a valve to hinder the return of the serosity to the trunk of the *cava*.

How matters gathered in the cavity of the breast are discharged into the ureters.

Fallopius was of this mind, that a branch of a vein passeth from the *vena sine pari* to the left kidney, by the which quittour and water may be discharged by urine. But it is more probable, that these matters are first drawn in into the trunck of the *aorta*, by its inconspicuous pores, and from thence sent to the kidneys by the emulgent arteries.

These are in number two, one in

in each side which accompany the veins to the kidney slope-ways. Whither when they are come, they are devided into two branches, whereof the one is implanted in the lower, the other in the upper part of the hollow part of the kidney.

The nerves on each side spring either from *ramus stomachicus*, and that is but one and small, and is spread through the proper coat; from hence ariseth the consent between the kidneys and the stomack. So that vomiting is troublesome in nephritical diseases.

The Arteries.

One may think that nature hath afforded arteries larger than was requisite to afford life to so small bodies as the kidneys are; but it was fit so to be; for the passages were to be patent, which were to discharge the heart and arteries of serosity.

The nerves.

The artery lyeth between the vein and the ureter; partly to hasten the blood to the Kidney; partly, speedily to discharge the watrishnesse.

The place of the artery.

The veins and arteries are not joyned with the water-pipes; for if you put a catheter into the ureter, by blowing the veſſell will not ſwell.

CHAP. XVIII.

Of the Ureters.

THe Ureters in Latine *Meatus Urinarii*, are called in Greek οὐρητῆρες, either from οὐρέειν, to piſſe, or ὅτι ἔχουσι πρίσις, becauſe they keep the urine.

Their number. There is one in each ſide.

Their ſubſtance There are white veſſels, like to veins, yet they are whiter, thicker and more ſinewy. They reach from the kidney to the bladder.

Their coats. They have two coats, the one common from the *peritonæum*; the other proper, from the external or common coat it hath capillar veins and arteries.

Its fibres. It hath few oblique fibres, but moſt ſtraight. It ſpringeth from the bladder, for it cannot be ſe-

vered

vered from it easily, as from the kidneys.

Yet it differeth from the bladder in two things.

How the ureter differeth from the bladder.

First, in that the bladder hath three coats, but it onely two.

Secondly, the bladder hath all sorts of fibres but the ureter hath most straight, few oblique.

They are inserted in the back and lower part of the bladder, not farre from the muscle sphincter, between the two proper coats of it, about the length of an inch.

Why the insertion is oblique

This insertion is oblique to hinder the regurgitation of the urin, when the bladder is either compressed or distended with urine. Although the ureter doth not ordinarily exceed in compasse a barley corn, yet when stones do passe, it becometh sometimes as large as a gut.

BIBLIOTHECA BODLEIANA

CHAP. XIX.

Of the bladder.

Its place. THe bladder is ſeated in the *hypogaſtrium*, in the place called *pelvis*.

Its ſubſtance. Of ſubſtance it is membranous, becauſe it was to admit large ſt etching.

Its membranes. The membranes of it are three.

The firſt is from the *peritonæum*; for it is lapped within the reduplication of it.

The ſecond is thicker, and endued with many ſtraight fibres, which *Aquapendens* will have to be a muſcle ſerving for the compreſſion of the bladder, as the ſphincter ſerveth for conſtriction.

The third and innermoſt is white and bright, of exquiſite ſenſe, as they can witneſſe who are troubled with the ſtone.

Its fibres It hath all ſorts of fibres.

Its cruſt. Within it is covered with a mucous cruſt, an excrement of the third concoction of the bladder.

der. This doth mitigate the acrimony of the Urine.

It is perforate in three parts, to wit, in the sides where the ureters are to let in the urine, and before to let out the urine.

Its perforation.

The bladder hath two parts, to wit the bottom and the neck.

Its parts.

Both these in figure represent a pear.

Its figure.

The bottom is upholden by the navel: First, in the middle by the ligament called *uraches*, which is the cause sometimes, that they who have a great stone in the bladder, complain of great pain about the navell.

How it is upholden.

Secondly, by the umbilical arteries dried lateral.

If the bladder were not suspended, a man going straight up, the bottom of the bladder would compress the neck, and cause difficulty in making water.

Why mans bladder is suspended.

In man it lieth between *os pubis* and the *intestinum rectum*. In women between the neck of the matrix and *os pubis*.

Its seat in Man and woman.

The bladder of man differeth

How the bladder of Man differeth from the bladder of beasts.

from the bladder of beasts in two things. First the bladder of man is couched within the reduplication of the *peritonæum*, but in beasts it is loose, and onely is tied to the *intestinum rectum*.

Why stones are gendred in it.

Secondly, the badder of man hath fat without, but the bladder of beasts none.

In it stones are promptly engendered, because the heat of it is compact: so red hot iron burneth worse than the flame of fire.

Why there is a consent between the bladder and kidneyes.

There is a great consent between the bladder & kidneys. So that In diseases of the kidneys, difficulty in making water sometimes happeneth. The causes of this consent are two.

First, the communion of office; for both serve for the excretion of urine.

Secondly, the similitude of substance; for both the inside of the kidneys and the bladder are membranous.

An Observation.

One thing is to be noted that a bladder is bestowed onely upon such creatures as have bloody lungs,

lungs, and the hotter the lungs are, the bigger the bladder is.

Why the bladder in man is big.

So man according to his ſt ture, hath of all living creatures[a] the biggeſt bladder; according to *Ariſt. lib. Hiſtor. Animal.* Becauſe the bladder is of a cold temperature, therefore in deadly diſeaſes of it, ſleepineſſe oppreſſeth the Patient according to *Hippocrates. 6. Epidem.*

The muſcle ſphincters

In the neck onely the muſcle *ſphincter* doth offer it ſelf to be conſidered, whereof read in the doctrine of muſcles.

Its veſſels.

It hath veins and arteries called *Hypogaſtricæ*, implanted on every ſide of the neck, which are immediately divided into two branches; whereof the one is beſtowed upon the bottom, the other upon the neck.

Its nerues.

It hath remarkable nerves; partly from thoſe of the ſixth conjugation, which paſſe by the roots of the ribs, partly from thoſe which ſpring laſt from the *os ſacrum.*

The

The use of the bladder is to contain the urine, like a chamber-pot, until the time of excretion come, when the bladder is full.

CHAP. XX.

Of the generation of blood.

FIrst of all, every nourishment receiveth a preparation in the mouth. If it be solid, it is chewed by the teeth, from the mouth by swallowing it is turned to the stomack. It being embraced by the stomack and kept for a while is turned into *Chylus*, partly by the specifical heat of the stomack it self; partly by the heat of the adjacent parts; but chiefly of the liver, spleen, and caul.

How the Chylus is made.

The *Chylus*, being made light by concoction, it riseth up and passeth to the *pylorus*, and procureth the opening of it. This opened, the stomack by its transverse fibres, thrusteth the *chylus* into the *duodenum*. From hence it

it passeth more and more downwards by degrees. The wrinkles of the small guts hinder the suddain passage of it to procure an equall concoction of all the parts of it.

In the mean time the *vena lactea* draw from the small guts, whatsoever is alimentary of the *chylus*. While the *chylus* thus passeth to the liver, & is come to the divarication of the *vena porta*, the spleen by a naturall faculty by the *ramus splenicus*, draweth to it self the thickest and most terrestricall part, yet the purest onely may come to the liver.

When the *chylus* is come to the liver, the choler is sent either by *meatus cysticus* to the gall or to the *jejunum*, by *meatus hepaticus*.

The blood being perfected, the grosser part is carried by the branches of the *vena porta*, and the splenicall to the nourishment of the parts appointed for nutrition; but the purest part is carried to all other parts for their nutrition: and because much watrishnesse

triſtneſſe is mingled with the blood, that it may paſſe without difficulty, by the narrow paſſages of inoſculations, to the *vena cava*, (ſeeing the ſeroſity is unapt to nouriſh) it is ſent by the emulgent veins and arteries to the kidneys, and from thence by the ureters to the bladder.

CHAP. XXI.

Of vaſa præparantia in Man.

HItherto we have handled the parts appointed for nutrition Now it followeth to run through the parts ordained for generation to continue man-kind.

The differences of the genitals

The genitals are of two ſores; the male and female; and ſo it was requiſite for procreation; for this action requireth an agent & patient: ſeed and menſtruall blood.

The firſt is the place of the plaſmatick ſpirit. The ſecond affordeth ſupply of matter to the ſpirit, to draw out the admirable frame

frame of the regions and parts of the little world.

In man ſome of theſe parts afford matter for the ſeed, to wit, the four *vaſa præparantia*: ſome elaborate this matter, as the *corpus varicoſum*: ſome make the ſeed fruitfull, as the ſtones; ſome carry the ſeed back again, and make it pure as thoſe wch are called *vaſa deferentia*: ſome contain the ſeed and an oleaginous matter, as the *veſiculæ ſeminales*, and the *proſtates*; ſome diſcharge the ſeed into the matrix: this is done by the *penis*.

The parts of the genitals in man.

Vaſa præparantia, which prepare matter for the ſeed, are of two ſorts, veins and arteries.

vaſa præparantia.

The veins are two. The right ſpringeth from the trunck of the *vena cava*, a little under the emulgent.

The left proceedeth from the emulgent.

The arteries ſpring from the trunck of the *aorta*, theſe veſſels being a little diſtant one from another, are tied together by a thin membrane

The Arteries.

membrane which ſpringeth from the *peritonæum*, and met often by the way by inoſculation. Theſe veſſels are greater in men than in women, and the arteries are bigger than the veins, becauſe much heat and plenty of ſpirits are required for the ſeed. They enter into the groyn obliquely, carried together with the muſcle cremaſter, between the two coats of the *peritonæum*.

In curing of a rupture by inciſion, if the muſcle cremaſter do fall out to be bound by the ligature, *Spaſmus cynicus* enſueth.

The ending of the veſſels.

Theſe veſſels do end about the beginning of the teſticles, and from hence are called ἑιλισσόμενα, and make up that part which is called *corpus varicoſum*, *paraſata*, & *plexus panpiniformis*. From the ſtones to it many ſmall fibres paſſe.

Corpus varicoſum.

The *corpus varicoſum* is framed of the twiſting of the *vaſa præparantia*; which maketh a long thick, *glandulous*, but hard welt, without any remarkable cavity, which

which passeth to the bottom of the stone, and from thence to the *vas differens*, where it endeth.

Here the venall and arteriall blood being elaborate in these admirable windings, is further prepared, a quality being imparted from the seminificall faculty of the stones.

CHAP. XXII.

Of the stones.

THe stones in Latine are called *Testes*, because they testifie one to be a man.

They are glandulous bodies, fluggy, soft, and white, without any cavity, full of small veins and arteries, such as are not in any part of the body. *Their substance*

They are in number two, and therefore in Greek are called διδυμοι. *Their number.*

Their figure is ovall, the right is hotter, and better concocteth the seed: Wherefore by *Hippocrat.* it is called ἀρρένογονον, a begetter of the male. *Their figure.*

The

The left stone is more full, and hath a bigger vein; yet the seed which is there elaborate, is more watrish, and colder, because it proceedeth from the emulgent, and is called of *Hippoc.* θηλήγονος, because it begetteth the female. In the stones there are to be considered their coats, substance, and use.

Their coats. Their coats are four.

First, *bursa seroti*, and it is nothing else but the skin covered with the *cuticula*: And because it cleaveth firmly to the *Membrana carnosa* under it, so that they seem to make but one coat, it cometh to passe that in cold it doth contract it self, and becometh wrinkled.

The line In the lower part it hath a line, according to the length, whereby it is divided into the right and left side; this line is called *sutura*, or a seame.

Secondly, it is called by *Rufus*, *dartos*: because it may easily be stead from the *tunica vaginalis*: by the Ancients it was called *erithroides*,

ides, because it appeareth to be red, by reason of the fleshy fibres, wherewith it is enterlaced.

This ariseth from the *membrana carnosa*; which here is more thin and subtile than else-where, and stored with veins and arteries.

The third is *elythroides*, or *vaginalis*; because it contains the stone as a sheath. It is a thick and strong membrane, having many veins. In the outside it is uneven, by reason of the fibres by the which it is tied to the *dartos*; but in the inner side it is smooth. This is nothing but the production of the *peritonæum*.

The fourth is ὑμὴν νευρώδης, the nervous membrane called, *albuginea*, from its colour, It is white, thick, and strong, framed of the externall tunicle of the *vasa præparantia*. It is immediately wrapped in the stone; between these two the water is contained in *Hernia aquosa*.

The substance is described in the beginning of the Chapter.

Each

Each ſtone hath one muſcle called *cremaſter*, from κρεμάω, or κρεμάζω, which is to hold up; becauſe it pulleth up the ſtone in the act of generation, that the veſſels, being ſlacked, may the more readily void the ſeed.

This muſcle is nothiug elſe but the lower part of the oblique muſcle, aſcending near to *os pubis*, which outwardly wrapping the production of the *peritonæum*, is carried to the ſtone.

Theſe muſcles in ſickneſſe and old age become flaggy, and ſo the *ſcrotum* relaxeth it ſelf, and the ſtones hang low.

The uſe of the ſtones are three.

The firſt is to elaborate the ſeed by reaſon of the ſeminificall faculty reſident in the *parenchyma* of the ſtones; for they turn the blood, which is brought by the *vaſa præparantia*, into ſeed, for the moſt part; the reſt they reſerve for their own nutrition.

The ſecond is, they add heat, ſtrength & courage, to the body, as gelding doth manifeſt, by the which

which all these are empaired.

Thirdly, they receive the superfluous humidity of the seed, by reason of their glandulous substance.

CHAP. XXIII.

Of the Vessels that carry the seed, and those that keep it.

Vasa differentia, the Vessels which carry the seed; in colour they are white; in substance sinewy, having an obscure hollowness; from hence they are called *Meatus seminales*. They spring from the lower end of the *parastata*. These mount up by the sides of the *Vasa præparantia*.

When they are come within the cavity of the belly, they turn back again and passe to the backside of the bladder; between which, and the *intestinum rectum* they passe, untill about the neck of the bladder, being somewhat severall, and at last being joyned together

together, but not united, are inserted on each side in the glandulous bodies called *prostatæ*.

Vesicula seminalis

Before they come thither they are joyned to the *Vesicula seminalis*. These in figure represent the cels of a Pomegranate, or honey comb.

Their substance.

These contain an oily and yellow substance, for they draw unto themselves that which is fatty in the seed.

They are more in number, that the oleous substance should not forcibly and plentifully be poured into the *urethra*, but should gently and slowly passe from one unto another by windings, and at last be poured into the conduit of the yard by a hole which is shut up with a fleshy substance, partly to stay the involuntary effusion of it, partly to hinder the regurgitation of it. It being poured into the *urethra* chiefly in the time of carnall copulation, doth moisten it that it shrink not, and suffereth it not to be offended by the acrimony of the seed or urine. The

Vasa

Vasa differentia passing by these, go to the glandules, called *prostatæ*, by the which they are compassed.

When they are come to the *urethra*, a caruncle as a valve is set before the orifice of each of them; partly to hinder the coming of the urine into them, partly to hinder the involuntary effusion of the seed.

The use of the caruncle in the Urethra.

Under and by this caruncle on each side there are three holes, through which the seed passeth into the urethra. These holes are discerned easily in a gonorrhea inveterate, although not so easily in a sound person.

The holes by which the seed passeth to the Urethra.

The seed doth passe through these inconspicuous passages, as quick silver through lether, by drops. The seed having been made subtile and spirituous by sublimation through the *Vasa deferentia* ascending, is able to pass through inconspicuous passages.

Prostatæ, or *glandulæ seminales*, are glandulous bodies, placed between the neck of the bladder, and

and the *inteſtinum rectum*. Although there is no conſpicuous paſſage by the which the ſeed paſſeth into the urethra; yet the thick membrane which wrappeth in the proſtate, where it leaneth upon the urethra, is thinner, and hath many pores, which are dilated by heat in the act of generation, and may be ſeen in an inveterate *gonorrhea*.

A continuall dilatation of theſe procures an uncurable *gonorrhea*.

The ſphincter of the bladder compaſſeth theſe glandules. In drawing of a ſtone, if theſe parts be torne, the party becometh barren.

Perinæum.

The diſtance betwixt the root of the *cod* and the *podex* is called *perinæum*, becauſe it is ſtill moiſt with ſweat. The *pubes*, *ſcroton*, & *perinæum* in men, are furniſhed with hair, becauſe glandules are placed there, which receive plenty of ſuperfluous moiſture: a part whereof they ſend to the skin for the generation of hair. If the

Why theſe parts in men are hairy.

ſeed

seed chance to be corrupted in man, it causeth not so fearfull symptoms as in a woman, because the seminary vessels are without the *hypogastrium* in man, but in women within.

Why corrupt seed is worse in women than in man.

CHAP. XXIV.

Of the Yard.

IT is called in Latine *Penis*, *à pendendo*, because it hangeth without the belly: and it is an organicall part, long and round, yet somewhat flat in the upper part, seated about the lower part of *os pubis*, appointed for making of water, and conveying the seed into the matrix.

The description of it.

It is framed of such a substance as might admit distention and relaxation.

The parts of it are either common or proper.

Its parts.

The common are three, the scarf skin, the skin, and the *membrana carnosa*.

It hath no fat, for it would have hindered the stiffnesse of it.

Why it hath no fat.

The

The cuticula and cutus.

The *Cuticula* is of a reasonable thickneſſe: the skin is somewhat thick, flaggy, when there is no erection, but ſtiff when there is.

The membrana carnoſa.

The *membrana carnoſa* is somewhat ſinewy.

The internall parts.

The proper or internall parts are theſe, the two nervous bodys, the *ſeptum*, the *urethra*, the glans, four muſcles and the veſſels.

The two bodies.

The two bodys are long, hard, and nervous. Theſe within are ſpongious and full of black blood. The ſpongious ſubance ſeemeth to be a net-like texture, framed of innumerable twigs and veins and arteries.

This black blood contained in theſe laterall Ligaments, being full of ſpirits waxen hot by the ſtings of *Venus*, doth diſtend the parts.

Theſe two laterall ligaments, where they are thick and round, ſpring from the lower part of the Share-bone. In their beginnings they are ſeparate one from another, and repreſent the two horns of *Pythagoras* his Y, that the

Vrethra

Urethra may pass between them.

But as soon as they come to the joyning of the share-bone, they are by the *septum lucidum* evert:d. It is nervous and white. Septum lucidum.

It ariseth from the upper part of the commissure of the *os pubis*, and upholdeth the two laterall ligaments and the urethra, as a stay. The like is found in women to uphold the *cunnus*. Under these lieth the urethra.

It is of a substance nervous, thick, loose, and soft, like to that of the lateral ligaments, it beginneth at the neck of the bladder, yet it doth not spring from it, but is joyned to it onely, & so passeth to the glans. If you boil the bladder and it, it will separate it self from the bladder. *The* urethra.

It is framed of two membranes, the one is internall, with the which the glans is covered; it is bred of the thin membrane which covereth the nerves of the prick. It is of an exquisite feeling, that it might feel the acrimony of the seed, and cause pleasure, *Its frame.*

chiefly in that part of it which lieth between the proſtates.

The externall is fleſhy, & hath many fleſhy tranſverſe fibres. The middle ſubſtance is fungous, and full of black blood, that it might ſuffer diſtention and relaxation with the latter ligaments.

At the beginning of it there are three holes, one in the middle largeſt, and two leſſer, in each ſide one, from the paſſage which is ſent from *veſicula ſeminales* to the urethra.

Its muſcles.

The muſcles are two in each ſide, and ſo four in all. Of theſe collaterall muſcles, the one is ſhorter and thicker, and ſpringeth from the *appendix*, or knob of the *coxendix*, under the beginning of the laterall ligament, and aſcending obliquely, is inſerted into the ſame, a little below the beginning of it; this ſerveth for erection.

The ſecond is longer and ſmaller, proceeding from the ſphincter of the *anus* fleſhy.

This paſſeth ſtaight under the urethra,

urethra, and is inserted about the middle of it, in the side of the prick. These two muscles dilate the lower part of the urethra for miction and ejaculation of the seed, As the first muscle is termed *erector*, so this is called *accelerator*, or hastner.

This hath a substance agreeable with that of the *penis*; for this in erection is drawn towards its beginning, and the erection ceasing, it becometh lank.

Glans is the extream part; it is somewhat round, compasseth with a circle, as with a Garland. It is soft, & of an exquisite feeling, by reason of the thin skin, with the which it is covered. About the root of it: where it is joyned with the nervous bodies there is a little pit: In the which if any sharp humour be lodged, as in *gonorrhœa virulenta*, great pain is caused.

The Glans is covered with *præputium*, the foreskin; it is framed of the reduplication of the skin. Præputium.

The ligament by the which it is tied to the glans in the lower part Frænum.

of it, is called *frænum* the bridle.

The vessels. Of the vessels, some are cutaneous, some pass to the inner parts of the *penis*.

The *Cutaneous* veins and arteries spring from the *pudenda*; these entring at the root of the prick, they pass by the sides towards the back of it, and are conspicuous enough. The vessels which are bestowed upon the inner parts of *penis*, come from the *Vena* and *arteria hypogastrica*, about the roots of the laterall ligament. Here the arteries are remarkable, which are wonderfully dispersed through the body of the *penis*: for the right artery is bestowed upon the left side, and the left side upon the right side.

Its sinews It hath two sinewes from the *Os sacrum*. The lesser is bestowed upon the skin; the larger mounting up under the share bones to the root of the yard between the laterall ligaments; is bestowed upon the muscle, the rest of the body of the *Penis* and the Glans.

Of the GENITALS in Women.

CHAP. XXV.

Of the Cunnus.

THe genitals in a Woman have four distinct parts; to wit, the *Cunnus*, the Matrix, the stones, & the spermatick vessels.

Cunnus is that part which offereth it self to the sight before section. In it eleven particles are remarkable. *The particles of the* Cunnus.

1. *Pubes*, that particle where the hair doth first bud out; which ordinarily falleth out the fourteenth yeer of a womans age; the upper part of this which buncheth out, and is most hairy is called *Veneris mons*.

2. Is *Rima magna*, the great chink; it beginneth at the *os pubis*, and is but an inch distant from the *anus*. Wherefore it is larger then the cavity of the neck.

3. The *Labia* or lips; by these

the internall parts are covered, as the tongue and teeth by the lips. These are framed of the common integuments of the body, these have pretty store of spongeous fat.

4. Are the *Alæ*, or *Nymphæ*, the wings; these appear when the lips are severed: These are two productions framed of a soft and spongious flesh, and the reduplication of the *Cutis*, placed at the side of the neck: Being joyned above, they compass the *Clitoris*. In figure and colour they resemble the comb of a Cock.

5. Is *Clytoris*, this is a nervous and hard body: within, full of a black and spungious matter, as the lateral ligaments of the yard. It is framed of three bodys. The two laterall are ligaments, and spring from the internall knob of the *Ischium*. The third is between these; this ariseth from the joyning of the *os pubis*; at the end of it is the glans, which hath a superficial hollowness, and is covered with a very thin skin, as a *Præputium*, which springeth from the joyning

of

of the *Nymphæ*. And as it doth represent the prick of a man, so it suffereth erection, and falling; it may be called a womans prick. In some women it hath been as big as a mans.

6. Under the *Clytoris* above the neck, a hole is to be seen, by the which a woman maketh water.

7. After the *Nymphæ* four caruncules, resembling the leaf of the mirtle shrub, are to be seen: Whereof that which is uppermost, is largest and forked, that it might rechive the end of the neck of the bladder, the other is below: The other are on the sides. All four keep back the air, and all other things from entering into the cavity of the neck, and by tickling the genitall of man cause the greater delight. In women which have not born children, they are most conspicuous.

These caruncles are framed of the reduplication of the fleshy neck of the genital.

8. Behind the caruncles appeareth a cavity in the lower part of the

neck of reasonable largness, framed by nature to stay the seed poured into the neck from too quick slipping out.

9. In Virgins these caruncles are joyned together by a thin and sinewy membrane interlaced with small veins, cleaving orbicularly to the sides of the neck, having a small hollowness in the middle, which will receive a pease, by the which the menstruall blood passeth: Some times it is hollow like a siev, it is called *hymen*.

10. Behind these caruncles and the *hymen* appeareth a chinck, under the orifice of the bladder between the two wings, wch is the entrance into the neck.

The neck. 11. Now the neck is nothing else but that distance, which is between the *Cunnus*, and the mouth of the matrix.

Its length In women of an ordinary statues, it is eight inches in length.

Its substance. The substance of this part is hard, without fleshy, within membranous and wrincked, like to the inner skin of the upper jaw of a cows mouth. First,

First, to cause greater pleasure in the act of generation.

Secondly, the better to retain the seed.

Thirdly, to admit the greater dilatation in travell.

Its seat.

The neck is seated in that cavity of *hypogastrium*, which is called *pelvis*, between the bladder and *intestinum rectum*. It hath two membranes; if you cut them transversly, you shall perceive between them a spongious flesh: such as is found in the lateral ligaments of the *Penis*. This causeth it to swell in the act of generation, innumerable sprigs of veins and atteries affording plenty of spirits.

Its vessels.

The hypogastricall veins are inserted into the neck of the Matrix: from thence passing to the mouth of the Matrix: As soon as they come to be implanted into the substance of the *uterus*, they lose their own coats which are bestowed upon the first membrane of it. From thence by small pipes (such as are found in sponges, but wreathed) blood is

carried to the Matrix: by these veins the terms issue into the neck of the genitel.

A large branch passeth from *arteria hypogastrica*, to the neck. A sprig of it, but wreathed as communicate to the testicle, passing thither between the two membranes of the body of the Matrix: This sprig is winded to hinder it from ruption, when the Matrix is enlarged, a woman being with child.

CHAP. XXVI.

Of the Matrix.

THe matrix was appointed by Nature to be the field of Nature, to receive the seeds of man and woman, for the procreation of man, and the continuation of mankinde.

The parts of it. It hath two parts, *os uteri*, the mouth of the Matrix, and *fundus* the bottom.

The mouth of it. The mouth is a hole at the entrance of it, which like a mouth may be dilated, or pursed in: this entrance

trance is but a transverse line, which when it is exactly opened becometh round.

This orifice, although in the act of generation it may be so dilated, that it will receive the glans of a mans genitall; yet after conception it is so closely shut, that it will not admit the point of a bodkin; when a woman is delivered it so openeth it self that it maketh way for the infant be it never so big. In those who have been mothers, it is like to the mouth of a whelp. The cancer of the matrix most commonly beginneth here, because it is somwhat fleshy: within this orifice a long knobby substance is placed, to help the shutting of the orifice the more exquisitely. About this knobby substance small wholes are to be seen, which seem to be the ends of the ejaculatory vessels.

In figure it is like a pear or a cupping glass. *Its figure.*

In virgins even of big stature it exceedeth not the bigness of a walnut; But in those who are with child, *Its bigness.*

child, it doth dilate it self into that capacity, as is able to contain the child.

Why it is small. It was to be small, becauſe the ſeed in quantity is but little, wch it ought to embrace and cheriſh.

No diſtinct cels in it. It hath no diſtinct cels, as the matrix of a beaſt hath; only a line, as in the tongue, & cod, doth ſeparate the right ſide from the left. In length from the orifice to the extremity of the bottom, it is thought to be three inches.

Its frame The internall ſuperficies is rough, the better to keep the ſeed.

The matrix is framed of two membranes; the external ſpringeth from the *Perltonæum*, and is the thickeſt of all other that ſpring from it. It is ſmooth & ſlippery, if you except thoſe parts where the ſpermatick veſſels enter into matrix; and the ligaments go out. The internal membrane is full of ſmal holes, where the matrix covereth the *inteſtinum rectum*.

When the courſes flow they are eaſily ſeen; but not when they ceaſe. The Ancients did take theſe

to

to be the mouths of the veins and arteries.

And because they resemble in figure the measure appointed for the selling of vinegar, they called thē *Acetabula* or *Cotyledones*. By these holes the menstrual blood issueth. Acetabula.

Above at the sides of the external membrane two little bunches, such as are seen in Stirks or Heifers, when the horns begin to bud are to be marked. They are called *cornua uteri*. Cornual uteri.

For nourishment it hath both veins and arteries. Its vessels.

Of these the veins are bigger than the arteries: the veins spring from two branches on each side: one branch cometh from the *vasa præparantia*: this doth descend, and is spread thorow the whole matrix: but chiefly through the bottom: & seeing the sprigs are implanted in each side, the right are coupled with the left by inosculation. The Veins.

The other branch, which cometh from *ramus hypogastricus*, doth ascend from the lower parts, and is sent partly to the orifice partly

partly to the bottom. These are larger than those which spring from the *vas preparans*. Both these being dispersed through the substance of the matrix, are united by inosculation also.

Some will have the menstruall blood to flow from the twigs sent from *Ramus hypogastricus* when a woman is with child: being perswaded by the *Aphorisme* of *Hippocrates lib. 5. Aphor. 51.* that nothing can flow from the cavity, the orifice being so shut that it cannot admit the point of a bodkin; but the word συμμυνει, signifieth onely *conivens*, or shut together, as the eye lids are. And although in the first moneths the orifice be exactly closed; yet when a woman is great with child the orifice gapeth a little and is shut with a mucous seminal substance, which doth repell the air, and lubricate the orifice in the delivery.

Its arteries.

It hath arteries also, which spring from the preparing arteries, and from the *hypogastrica*, as the

the veins did; these accompany the veins, and are distributed as they are.

The sinews first do spring from the sixth conjugation: they are small and are bestowed upon the bottom; then from the parts wch spring from the *os sacrum*. *The sinews.*

These are bestowed partly upon the lower part of it, and partly upon the *Cunnus*. These are larger, because in the acts of generation great delectation is required.

By these vessels, arteries, veins, and nerves, the matrix hath a consent with all the rest of the body. And although the veins and arteries seem to be small in women which are not with child yet in those who are with child, by the effluxion of blood they will, sometimes become as thick as a finger. Yea in such the matrix, which otherways is membranous, as hath been said, becometh in the last moneths thicker and softer; so that about the upper part of the bottom; unto the which the *placenta uteri* is tied, it becometh almost

almoſt two inches thick.

The matrix is onely tied to the adjacent parts laterally: for above, afore, and after, it is free, that it might admit dilatation, & deſcend or aſcend in the act of generation.

Its ligaments. Now the ligaments are in number four: The two uppermoſt, broad and membranous, are nothing elſe but productions of the *peritonæum*, which tie the matrix to the *oſſa ilii*.

They are looſe and ſoft, that they might admit dilatation with the matrix, when a woman is with child, and conſtriction, when ſhe is not.

Theſe carry the *vaſa præparantia & deferentia* to the matrix, and lap up the ſtones: they repreſent the wings of a bat, & ſails of a ſhip ſpread a broad. Theſe keep the matrix ſteady in its own place, that it neither aſcend nor deſcend.

The two lower ligaments are nervous, round and hollow; they ſpring from the ſides of the bottom of the matrix, near to the *vaſa deferentia*, which they touch; they go

go down to the groyns, by the production of the *peritonæum*, ſtrengthened by the glandules: & being dilated like a membrane they beſtow one part upon the *clytoris*: the reſidue paſſeth to the knee, in the inſide of the thigh by the *menina adipoſa*: this is the cauſe why women after conception feel pain in the inſide of the thigh.

Theſe ligaments ſerve not only to ſave the matrix, but becauſe they are hollow, by them noyſom humors of the genitals are ſent to the glandules of the groyns. So after impure copulation, the ſeminary veſſels being infected, the contagious humours, by theſe ligaments is ſent to the groyns; from whence ariſe *bubones venerei*.

CHAP. XXVII.

Of the ſtones and the ſeminary veſſels.

WOmen have ſtones as men have; but they differ in eleven things. 1. In

The differences between the stones of a woman and of a man.

1. In situation; for they are placed not without the *hypogastrium*, as in men; but within it: that they might be the hotter and more fruitfull.

2. In quantity; for they are lesser.

3. In their frame; for they are composed of five or six bladders, wch make them uneven; whereas the stones of men are smooth: these bladders contain an humidity like to whey; but it is thicker.

4. The stones of women have no *cremasters*; but are stayed by the broad laterall ligaments, called the bats wings.

5. They have no *prostates*.

6. They differ in figure; for in man they are ovall, but in women flattish.

7. They have but one membrane; whereas men have four.

8. In substance; for they are more soft and flaggy than in men.

9. In temperature; for they are more cold than mans stones, and contain a thin waterish seed.

10. In

10. In women they are tied to the sides of the *uterous*, by the two upper ligaments, which are loose and membranous.

11. In women which are not with child, they are placed above the matrix, two inches distant from it.

Its veins.

The seminary vessels preparing are four; two veins, and so many arteries.

The vein of the right side springeth as in man from the trunck of the *vena cava* under the emulgent; but that of the left side springeth from the middle of the emulgent of the same side.

Its arteries.

Both the arteries spring from the descending trunck of the great artery. These veins are not united as in man, before they come to the stones, but are divided into two branches. Whereof the greater being stayed by the membranous ligament, is carried to the stone; but the lesser endeth in the bottom of the matrix in the upper part, for the nutrition of the matrix, and the *embryo*.

These

The difference between these and those in men.

These *vasa praparantia* differ from those in men in these things.

First, they are shorter than in men, by reason of the shortnesse of the passage; but they have more wreathings where they make *corpus varicosum*, about the stone, that the seed may be the better prepared.

Secondly, they pass not whole to the stones as in men; but are divided in the midway, as hath been said.

An observation.

One thing is to be noted, that the spermatick veins receive the arteries as they pass by the sides of the *uterus*, that the blood might be the better elaborate; for if you blow up the *vena spermatica*, both the right and left vessels of the matrix are blown up. From hence you may perceive the communion of all the vessels of the matrix.

Vasa deferentia.

The *Vasa deferentia* spring from the lower part of the stones. They are firm, white, & nervous. They pass by the membranous ligament to the matrix, not streight, but

but wreathed; that the ſhortneſs of the way might be recompenſed with the multitude of windings. Near the ſtones they are ſomewhat broad: When they have marched a little, they become narrow, and about the matrix they become broad again, and end in the *cornua* and capacity of it. Amongſt theſe veſſels, the laſt to be conſidered is *Tuba Fallopiana*. *Spigelius* calleth it *Vas cæcum*, *lib.* 8. *cap.* 20. becauſe it hath but one orifice, as the *inteſtinum cæcum* annexed to the *colon*; this ſpringeth from the *cornua* or bunches, and reſembleth the end of a trumpet, and paſſeth obliquely, over againſt the ſtone carried by the membranous ligament and compaſſeth the ſtones: but it neither proceedeth from the ſtones, neither is inſerted into them: And as in its beginning it is open; ſo in its ending it is ſhut. Tuba Fallopiana.

Riolan will have it be the end of the ejaculatory veſſel, ending within the matrix. He obſerveth

veth, that within it is to be seen a long, white and sinewy body, which he will have to be the continuation of the ejaculatory vessel. He noteth also that a small sprig doth pass, but wreathed, from the ejaculatory, by the sides of the *uterous*, to the orifice by the which women with child spend their seed in the act of generation: which *Spigelius* denied in the cited place, and checketh *Laurentius* for affirming such a passage.

THE

THE SECOND BOOKE, OF THE BREST.

CHAP. I.

Of the common containing parts of it.

HItherto then of the lower belly, the ſeat of the naturall ſpirit, and of the parts appointed for nutrition and procreation: Now it followeth that we handle the middle cavity, the ſeat of the vitall ſpirits, which containeth thoſe parts appointed for the cheriſhing of the naturall heat and diſtribution of the ſame to all other parts of the body, and the cooling of it, if it exceed the naturall degree.

This

Its situation. This ventricle is seated in the middle, between the uppermost, which is the head; and the lowermost which is the belly: for it was fit, that it should be so, that the heat passing through all and bestowing life, should equally be bestowed upon all the parts of the body.

Its limitation. It is severed from the head by the neck; from the belly by the midriff. It is bounded in the forepart by the breast-bone and cartilages. In the sides by the ribs: behind by the *vertebræ* of the back.

Its figure. The figure of it is oval, somewhat flat before and behind, whereas in beasts it is somewhat sharp: So that onely man lieth on his back.

Its substance, It is partly bony, partly fleshy, that it might admit motion, and yet not stifle the heart; the fleshy parts being suspended by the bony.

Its parts. The forepart of it is called *sternum*, the sides *costæ*, and the hinder part *dorsum*. The parts whereof

whereof it is compoſed, are either containing, or contained. The parts containing are either common or proper.

The parts containing common are in number four, *Cuticula*, *Cutis*, *pinguedo*, and *membrana carnoſa*. *The common containing parts.*

The ſcarf skin, and skin of it do ſuffer from thoſe in the belly: for it is hairy under the arm-pits, and above the pit of the heart: the skin of the back is both harder and thicker, and ſo is leſs hairy. 1, 2. Cuticula.

Secondly, the skin of the back-parts is of an exquiſite feeling: firſt, becauſe many twigs of ſinews are beſtowed upon it from the *Nerves*, proceeding from the *ſpinalis medulla*: ſecondly, by reaſon of the muſcles of the breſt placed there, which have many tendons, and ſo are very ſenſible.

As for the fat, it is not plentiful here, as in the belly: firſt, becauſe the naturall heat here is ſufficiently preſerved without it: ſecondly, becauſe it would have 3. Pinguedo.

hindered the motion of the breſt. Onely here it is ſomewhat yellowiſh.

4. *The* Membrana carnoſa.

The *membrana carnoſa* here in the fore-part of the neck is more fleſhy than in other parts, chiefly where the *muſculus quadratus* is framed, which pulleth down the cheeks and lips.

CHAP. II.

Of the Dugs.

The parts of the breſt.

THE proper containing parts are either external or internal. The external are in number three, the dugs, the muſcles, the bones. The internal proper containing parts are three in like manner; the *pleura*, the *mediaſtinum*, and the *pericardium*.

The paps of men.

Dugs are granted to both the ſexes; in men they are framed of the *cutis*, the *membrana carnoſa* fat, and the nipple, and ſerve onely for beauty, and are called *mammillæ*.

If in man a whitiſh ſubſtance repre-

repreſenting milk, be found in the nipples, which hath been ſeen, as witneſſeth *Ariſtot.* 1. *Hiſtor. Animal.* 12. it is unprofitable, and unapt to nouriſh.

The paps in women beſides theſe parts, have remarkable veſſels, glandules and pipes, to contain the milk perfected by the glandules. *The parts of the paps in women.*

The glandules are many, not one; that the milk might be the better elaborated, there is placed above the reſt one ſomewhat bigger under the nipple. Between theſe are placed innumerable veins and arteries, which receive blood from the matrix the material cauſe of milk. *The glandulous bodies.*

When theſe are full of blood, the milk is made by the property of the ſubſtance of the glandulous bodies, and their temperament. The milk perfected is ſent to the *tubuli lactiferi*, or conduits of milk, theſe end in the nipple.

The veins are of two ſorts, for ſome are external, ſome internal. *The veins*

The external ſpring from the axillar branch, and are placed under the skin which covereth the dugs, to nouriſh it, and are called *Thoracicæ ſuperiores*, or the uppermoſt breſt veins. The internal or inferiour called *mammariæ*, ſpring from the *rami ſubclavii*: They are in number two, whereof one doth march downward ſtraight by the ſides of the breſt bone. When they are come to the *mucronata cartilago*, they paſs out of the breſt and go downward by the lower part of the *muſculi recti*. When they are come to the umbilical region almoſt they are joined with the skin by ſundry inoſculations, with the *venæ epigaſtricæ*, which meet them there.

Theſe *venæ epigaſtricæ*, ſpring from the external *ramus iliacus*, and by a ſtraight way paſs upward under theſe muſcles. From this ſame branch ſpring the *venæ epigaſtricæ*, which are inſerted into the neck and bottom of the Matrix.

There

There are *arteriæ mammariæ* in like manner which ſpring from the *rami ſubclavii*, and get down to the navel. Whither when they are come, they are united by inoſculation with the *Arteriæ epigaſtricæ* aſcending. *The Arteries.*

They have nerves from the fourth intercoſtal nerve, which about the middle of the rib, perforating the intercoſtal muſcle, is divided into four branches which are ſent afterward to the pectoral muſcle, the thicker paſſing to the nipple. *Nerves.*

Between theſe glandulous bodies and veſſels, plenty of fat is placed, to procure ſmoothneſs and equality to the paps: if this be waſted either by ſickneſs or old age, the dugs become flaggy. *The fat.*

The paps are of figure round, both that they ſhould be more capable of milk, and leſs ſubject to bruiſing. *The figure of the dugs.*

In number they are two, that if one ſhould fail, the other ſhould ſupply the defect. *Their number.*

In men, women, and in Apes,

Their situation.

which carry their young ones in their armes, they are seated in the breſt.

1. That the mothers ſhould take their pleaſure by upholding the child.

2. That by the talking of the mother, the child ſhould learn to ſpeak and be indued with reaſon.

3. That being neer to the heart, they ſhould receive plenty of heat.

4. For beauty.

5. For convenient giving of ſuck; for the child cannot preſently go when it is born, but muſt be born in the armes and applyed to the teat.

6. For the commodity of the act of generation.

7. For the defence of the vital parts.

8. For the incitation of luſt.

9. To be a receptacle of excrementious humous: So women are often troubled with Cancers.

Of the Nipple.

The nipple is placed in the middle

middle of the dug, where the milk conduits end. It is a round body ſtanding out, that the infant may take hold of it with the lips. It is of a ſungous ſubſtance, that it may admit diſtention and contraction. It hath many holes; which appear when the milk is preſſed out. It is rougher then the other parts of the dug, that the infant may the more firmly hold it. It is of an exquiſite ſence, that the nurſe ſhould find ſome pleaſure when ſhe giveth ſuck. It is framed of the reduplication of the skin.

Now the milk which is drawn through the holes of it by the infant, is nothing elſe but a white liquor, engendred of the venal and arterial blood, ſent from the matrix, and altered by the glandules of the dugs; in taſte pleaſant: which is eaſily concocted by the ſtomack, and dooth ſpeedily and plentifully nouriſh. *What Milk is.*

As for the muſcles, they are ſet down in the Treatiſe of Muſcles, Chap. 15.

The bones which are said to be the third proper external containing part, are set down in the Doctrine of bones.

CHAP. III.

Of the proper internal containing parts.

THese are in number three, the *Pleura*, the *Mediastinum*, and the *Pericardium*.

The *Pleura* hath its denomination from the ribs, under which it is placed, and so it may be termed in English, the Costal membrane.

Its substance. It is a membrane, white, thin, hard, resembling the *peritonæum*.

Spigelius de human. corp. Fabr. lib. 6. cap. 3. will have it to be thicker and stronger then the *peritonæum*, contrary to the opinion of *Riolan*, who affirmeth the *peritonæum* to be thicker and stronger; because it is appointed for the sustaining the weight of the guts. It

It is every where double: the inner part is thickeſt, ſmootheſt, and as it were bedewed with a watriſh humour, that it ſhould not hurt the lungs by its roughneſs: This watriſh humour doth ſpring from the vapours raiſed from the blood condenſed, by reſpective coldneſs of the membrane. The outer part is thinner, yet is rougher; that it ſhould cleave the more firmly to the ribs. *Its parts.*

As for its figure, without it is arched, within hollow; Above it is narrower, below broader, chiefly towards the ſides: From it ſpring ſome ſinewy fibres, by the which the lungs are tied to it. If theſe be too ſtrait, the motion of the lungs is hindered, and ſo an uncurable difficulty of breathing procured. *Its figure.*

Above, it is perforate in five places, to give way to the *vena cava*, and the *aorta* aſcending, the *gula*, the wind-pipe, and the nerves of the ſixth pair. Below where it covereth the midriff, it is perforate in three places; *Its holes.*

to give a way to *vena cava* and the *aorta* descending, as also to the *gula*.

Its beginning. It is framed of the membranes covering the *spinalis medulla*; for those joining with the sinews of the breast, growing broader produce it.

Its vessels. It hath veins and arteries for nourishment and life; and nerves for feeling.

Its veins. On each side it hath 12 veins; whereof the two uppermost spring from the higher intercostal branch, and the ten lower from the *vena sine pari*.

Its arteries. So many arteries are in like manner; whereof the four uppermost proceed from the superior intercostal, and the inferior eight from the hinder part of the *aorta*, descending.

Its nerves. It hath twelve nerves in like manner; whereof the four branches which spring from the *vertebræ* of the breast are bestowed upon the fore-part, but the hindermost branches are bestowed upon the muscles, which are placed upon the back. These

These vessels are placed between the duplication of the *Pleura*; and the pleurisy it self is not seated in this place only; but between the *Pleura* also, and the intercostal muscles. It hath two uses; First, to wrap in all the vital parts. Secondly, to defend them from all external injuries.

The seat of the vessels and the plurisy.

It uses.

The second membrane is the *Mediastinum*: because it standeth in the middle of the breast, and divideth the right side from the left.

Of the Mediastinum.

It hath not onely a duplication as the *Pleura* hath, but is double also, for one is in the right side, the other in the left. They are united according to the longitude of the *vertebræ* of the back; but severed towards the *sternum*.

In the cavity between these parts of the *Mediastinum*, one may be deeply wounded, without any great danger of death. Such a wound you shall easily discern; First, if small store of

Observation.

of blood iſſue out, Secondly, if no breath come out.

This cavity is ſeen when the *Cartilago xiphoides* is removed. In the dropſie of the lungs, and when corrupt matter is gathered, the *ſternum* here may be tripaned.

Its ſubſtance. The ſubſtance of it is membranous, yet thinner and ſofter than the *Pleura*. The innerſide towards the lungs is ſmooth, and hath fat about the veſſels, but the exteriour is rougher, by reaſon of the fibres, by the which it is tied to the *Pleura*.

Its largeneſs. It reacheth from the throat to the midriff.

Its veins, Its arteries. As for its veſſels and arteries, it hath from thoſe called *mammariæ*, but ſmall, and from *vena ſine pari*.

It hath one ſpecial vein called *mediaſtina*, which ſpringeth from the lower part of the *ramus ſubclavius*.

Its nerves. The nerves called *ſtomachici*, paſs by the reduplication of it. It hath three uſes: Firſt, it divideth

videth the breſt and lungs in two parts, that one being wounded, the other ſhould be ſafe.

Secondly, it holdeth up the *pericardium* firmly, wherein the heart is contained, that it ſhould not reſt upon the back bone, when we lie upon our back; or that it ſhould fall upon the breſt bone when we bend our ſelves towards the ground; or touch the ribs when we lie upon our ſides.

Thirdly, it giveth a ſafe paſſage to the veſſels which paſs by it.

Of the Pericardium.

The third proper containing part is the *pericardium*, ſo called becauſe it compaſſeth the whole heart, whoſe figure it hath, for it is pyramidal. It is ſo far diſtant from the heart, as is ſufficient to give way to the motion of the ſame, and the containing of the watriſh humour.

Its membranes. Its connexion. Its beginning.

It hath two membranes: 1. Outer from the *mediaſtinum*, it is tied before and behinde to the *pleura*; from whence both the *mediaſtinum* and *pericardium* originally ſpring. 2. Inner, proceeding

ceeding from the external tunicles of the veſſels of the heart: for within the *pericardium* the veſſels lack their common tunicle, it having been ſpent upon the *pericardium*.

The external membrane is fibrous; but the internal is ſlippery, but firm and thick. The motion of it is ſecondary from the heart.

Its ſituation. It leaneth more to the left ſide then to the right, and more to the fore then back part. It cleaveth ſo firmly to the nervous circle of the midriff, that it cannot be ſeparate from it without rending, to direct the motion of the heart.

Its holes. It is perforate in five places. In two, for the entring in and paſſing out of the *vena cava*. In three for *vena arterioſa*, and *arteria venoſa*, and the paſſing out of the *aorta*.

Its veſſels. It hath ſmall veins from the *phrenicæ*, and the axillar. No arteries appear, becauſe it is neer enough to the heart.

It

It hath two uſes: Firſt to keep the heart in its own place, whether we bend our bodies backward, forward, or to either ſide. *Its uſes.*

Secondly, to contain the watriſh humour which is ſundry wayes profitable: for firſt it tempereth the heat of the heart: Secondly, it moiſteneth the ſame. Thirdly, it maketh it ſlippery: Laſt of all the *pericardium* defendeth the heart as an armour from all external injuries.

The watriſh humour which is contained in the *pericardium*, is like urine, yet not ſharp or ſaltiſh. If it be thick and ſlimy, it cauſeth the heart to be hairy. If it be too copious, it cauſeth the panting of the heart, which is cured by phlebotomy; it is too plentiful in thoſe who have obſtructions of the meſaraical veins, liver, or ſpleen: for in ſuch the thinneſt part of the *chylus* onely is drawn for nouriſhment, and ſo the blood becometh wateriſh. *The watriſh humour in the pericardium.*

Some think it to proceed from a ſeminal aquoſity, even from the *Its generation.*

the first generation: as the aire within eares is from a flatuous. Others think it is ingendred of vapors raised from the blood, and watrishnes of the veins and arteries of the heart, and condensed by the respective coldnes of the membrane, and by this means the *peritonæum* and the *pleura* seem alwayes bedewed with moisture.

It seemeth that the first beginning of it is a seminal humidity, and that is maintained afterward by the vapors.

Somet mes also there is contained in the capacity of the brest, a bloody water to moisten and temper the heat of the lungs.

The bloody water in the capacity of the brest.

It is caused partly of the vapours raised from the vessels, partly of that portion of drink, which passeth to the lungs: and by reason of this water and blood did flow from the side of our Saviour pierced.

CHAP.

CHAP. IV.

Of the Trunk aſcending from the Vena Cava.

NOW the parts contained in the breſt, are either *vaſa* or *viſcera*, the veſſels or the entrals.

The veſſels are in number four the *vena cava*, the *vena arterialis*, the *arteria venoſa*, and the *aorta* or *arteria magna*. *The vena cava.*

The firſt is the *vena cava*, or *magna*, becauſe the hollowneſs of it is great. It hath its beginning from the liver. The orifice of it is three times as large as that of the *aorta*: being received by the right ear of the heart, it is expanded into the whole right ventricle of the ſame.

About the orifice of it are placed three valves called *trifulca*, or *tricuſpides*: becauſe ariſing from a large foot, they end into a narrow top repreſenting barbed arrowes. *Its valves*

Their ſituation is from without inward, ſo that the blood may

may be let in, but not to return. They proceed from a membranous circle, annexed to the orifice: They cleave to the *septum* of the heart; towards the point of it be ſtrong fibres ending in round caruncles.

If you would ſee theſe as the reſt of the valves, cut tranſverſly the ventricles of the heart neer to the *baſis*, and then they will appear.

The trunk deſcending.

It hath two trunks; one deſcending, and this is that which is cauſed of a number of ſmall veins, appearing in the hollow part of the liver, which meet about the middle of it in one trunk ſtill decreaſing in number, and increaſing in bigneſs.

The trunk aſcending.

The other aſcending; this is procured by a number of ſmall veins, ſpringing from the convex part of the liver, which end in like manner into one trunk about the middle of it.

This is bigger than the deſcending becauſe all the upper parts are fed by this onely; whereas moſt

most of the parts contained in the abdomen, are nourished by the *vena porta*.

The lateral sprigs of the trunk ascending.

Although it be not divided into branches until it come to the throat; yet it doth send forth sundry sprigs from the sides.

1. Phrenica.

The first is called *phrenica*, one in each side. It is inserted into the *diaphragma*, which is called *septum*, by a number of twigs, and from thence it bestoweth twigs upon the *pericardium* and *mediastinum*.

The second is called *Coronaria*, so called because like a garland it compasseth the *basis* of the heart. It sendeth sundry twigs to the outer parts of the heart; but chiefly to the left: because it needeth great store of nourishment, by reason of its stronger motion.

This hath a valve which hindereth the return of the blood, to the *vena cava*. This springeth from the *cava*, before it enter into the heart, and the blood is somewhat thick, and not attenuate

tenuate in the ventricles of the heart; for the ſubſtance of the heart being hard and firm, was to be nouriſhed by blood ſomewhat groſs.

3. Vena ſine pari.

The third is called ἀζυγος, or *ſine pari*, without a mate; becauſe it hath not a fellow as other veins have in the left ſide, if you except thoſe beaſts which chew the cud.

This ſpingeth from the *cava*, as ſoon as it is come out of the *pericardium*. It paſſeth out of the hinder and right part of the *vena cava*, about the fifth *vertebra* of the breſt. It doth not deſcend ſtraight way: But coming a little forward, it returneth towards the *ſpina*.

When it is come to the eighth or ninth rib above the *ſpina*, it is divided into two branches, to wit, the right and the left; Then paſſing by the diviſion of the midriff, which is between the two productions of it, they are ſpred through the abdomen. Of theſe two, the left is inſerted

ſerted into the left emulgent.

By this way *Fallopius* will have watriſh, purulent and bloody ſubſtances to be diſcharged, which ſometimes are contained in the breſt, while theſe branches march downward: In each ſide ten ſprigs bud out, which march through ſo many diſtances of ſo many of the inferiour ribs.

By which way matters in the breſt are diſcharged.

In the lower part of the rib, there is a groop to receive the ſprig. Wherefore when you make inciſion in an *empyema*, come not neer to this part. From this vein other ſmall twigs alſo proceed; which afford nouriſhment to the *ſpinalis medulla*.

Theſe are called *coſtales inferiores*, or the lower intercoſtals. The *vena ſine pari* thus being framed, the *cava* aſcending to the *jugulum*, ſtrengthned by the *mediaſtinum* and the *thymus*; which is placed in the uppermoſt part of the breſt.

Here the *vena cava* is parted into two remarkable branches: From

The divarication of the Vena cava.

From whence all those veins spring, which are sent either to the head or armes. One branch marcheth to the right, another to the left side: while they remain within the breast, they are called *subclavii*, because they march under the cannel bones; but when they are come to the arm-pits, they are called *axillares*.

Sprigs proceeding from the Cava within the breast.

Before they come to the arm-pit, sundry sprigs spring from them.

1. Intercostalis superior.

The first is *intercostalis superior*, this ariseth from the root of the divarication; and passing from the root of two ribs bestoweth twigs upon the distances of the two upper ribs, as the *vena sine pari* did: there is one in each side.

2. Mammaria.

The second is called *Mammaria*; this marcheth forward towards the upper part of the bone of the breast from thence it goeth down by the sides of it, and when it is come to the *cartilago mucronata*, about the sides of it, it passeth out of the breast, and

marcheth

marcheth by a ſtraight way under the ſtraight muſcles to the navil, where it is joined with the *vena epigaſtrica aſcendens* by inoſculation; which is the cauſe of that great conſent, which is between the paps & the matrix. This before it leave the breſt, it beſtoweth one branch upon the cartilaginous diſtances of ſeven of the *coſtæ veræ*, where the ſprigs of the *vena ſine pari* end. From theſe branches proceed ſome other remarkable twigs, which are beſtowed upon thoſe muſcles which are ſeated upon the breſt, and the dugs.

3. Mediaſtina.

The third is calleſt *Mediaſtina*, becauſe it is beſtowed upon the *mediaſtinum* together with the left nerve of the midriff according to the length of it.

4. Cervicalis.

The fourth is called *Cervicalis* or *vertebralis*. It is large in each ſide, marching upwards obliquely towards the back part, it cometh to the tranſverſe proceſs from the *vertebræ* of the neck, where paſſing through the holes of

of them, it beſtoweth branches upon the muſcles which lie above the *vertebræ*.

5. Muſcula inferior.

The fifth is called *Muſculi inferior*, becauſe it is ſpent upon the lower muſcles of the neck, which ſtretch out the neck and head.

6. *The internal jugular.*

The ſixth is the internal jugular; this ariſeth where the cannel bone is articulate with the *ſternum*. This joined with the nerve recurrent, and the ſoporal artery, marcheth by the ſide of the wind-pipe to the throat.

The external jugular.

The ſeventh is the external jugular; this marching up under the skin, and the quadrat muſcle which pulleth down the [illegible] cometh to the ear. This in [illegible] is bigger then the internal, [illegible] otherwiſe then it is in man.

CHAP.

CHAP. V.

Of Vena arterialis, and arteria venalis

THe ſecond veſſel in the breaſt is *Vena arterialis*. It is a vein from its office: for it carrieth natural blood to the lungs by the right ſide of the wind-pipe: It is called an artery, becauſe the coat of it is double, not ſingle as that of veins, it doth ſpring from the upper part of the right ventricle of the heart, and is implanted into the ſubſtance of the lungs by the right ſide of the wind-pipe.

Vena arterialis

The third veſſel is *arteria venalis*, called an artery, becauſe it carrieth arteriall blood; but a vein, becauſe it hath a ſingle coat as a vein. It ariſeth from the upper part of the ventricle of the heart, and is implanted into the ſubſtance of the lungs by the right ſide of the wind-pipe.

Arteria venalis.

The *Vena arterialis* hath three valves called *Sigmoides*, from the

The valves of theſe two veſſels.

figure of great *ſigma*, which anſwereth the Latine S. the figure is this *C*. They look from within outwards, to let out the blood; but to hinder the return of the ſame.

The *Arteria venalis* hath two valves called *mitrales*, becauſe they are like a Biſhops Miter. They look from without inward, to let in blood carried from the *vena arterialis*. They are bigger than thoſe of *vena cava*; and have longer filaments, and to ſtrengthen them many fleſhy ſnippets are joyned to them.

It hath two valves only, that the fuliginous vapours might the more readily be diſcharged.

It hath alſo but a ſingle thin coat, partly for the ſame purpoſe, partly becauſe the blood ſent from the *vena arterioſa* is cooled by the *bronchia* of the lungs, before it entereth into *arteria venalis*: it needeth not ſo thick a coat as an artery; and becauſe veins onely carry in blood, and arteries carry out; Therefore *arte-*

ria

ria venalis is placed in the left ventricle, and *vena arterialis* in the right. Both these vessels not far from their beginning, are divided into two branches, whereof the one passeth to the right part of the lungs, and the other to the left; and each of these is subdivided into other branches, untill at the last they end in small threds.

The greater branches accompany one another, so that the vein still marcheth with the *arteria* joyned together by many inoculations or *anastomoses*.

Between them the branches of *aspera arteria* march. These vessels are great, because the lungs by reason of their perpetual motion require much nourishment.

How the blood is carried to the left ventricle of the heart.

First, the blood is carried into the lungs by *vena arterialis*, and from hence to *arteria venalis*, by sundry *anastomoses*, and hence to the left ventricle of the heart, Where being made spirituous, it is sent by the *aorta*, to impart life to the whole body.

One thing is to be noted, that no air in its proper substance is carried to the heart: for the blood contained in these two vessels, is sufficiently cooled by the *bronchia* passing between them.

How the blood is cooled.

The blood is cooled. First, by staying in the lungs while it is in passing.

Secondly, by touching the *bronchia* cooled by the attraction of fresh air: And thirdly, by the continuall motion of the lungs.

One thing is to be noted, That in *arteria venosa* a little below the valves there is found a little valve ever open. It being removed, there appeareth a hole, by the which the blood passeth freely from the *vena cava* to it, and returneth by reason of this *anastomosis*; that the blood in the veins may be animate.

CHAP.

CHAP. VI.

Of the great arterie, and first of the trunk, ascending the same.

THe fourth vessel is the great artery called *aorta*; because it receiveth the air. It springeth from the upper part of the left ventricle of the heart, where it is largest and hardest.

Coronaria arteria.

Before it come out of the *Pericardium*, it sendeth too smal twigs, from each side, one wch compats the *basis* of the heart like a garland, and send down according to the length of the heart other twigs: These are called *Coronariæ*. These twigs are more in number, and larger about the left ventricle then the right, because it requireth greater plenty of nourishment, by reason of its stronger motion, which digesteth much blood.

It is placed between the windpipe and the *vena cava*, tied to the mouth of the stomack, passing

The situation of the aorta.

under the trunck of *vena arteriosa* upward: when it hath pierced the *Pericardium*, it is divided into two trunks whereof the one is called *truncus ascendens*, the ascending trunck: The other *descendens*, the descending.

Its trunks

Of these two the descending is largest, because it ministereth life to more parts.

The branches of the trunk ascending

This ascending trunck before it passes to the arms is divided into two branches, whereof one passeth to the right, the other towards the left arm; they are called *subclavii rami*, because they march under the cannell bones. When they are gone out of the breast they are called *Axillares*. From both the lower and upper part of both these branches, sundry springs do spring.

From the upper part.

From the upper part proceedeth *intercostalis superior*, wch bestoweth twigs upon the distances of the uppermost four ribs. From whence others are sent to the adjacent muscles, and the *spinalis medulla*.

From the lower part.

From the lower springeth that branch,

branch, which is called *Cervicalis*, but more fitly *Vertebralis*; for it ſpringeth behind where the *vertebræ*; from thence marching upwards it beſtoweth twigs upon the *ſpinalis medulla*, which enter by the paſſages, by the which the nerves, alſo upon the muſcles, which are placed in the hinder part of the neck, and at the laſt entereth into the *Cranium*; by that hole, by the which the *ſpinalis medula* deſcendeth from the brain.

This with its fellow when it is come to the cell of the wedg-like bone on each ſide of it, between the firſt and ſecond pair of ſinews, having been divided, cauſes *Plexus coroides*.

The ſecond, the *Arteria mammaria* which accompanying the *Vena mammaria*, is joyned with the *epigaſtrica arteria*, aſcending by inoſculation about the navell. 2.

The third is that called *Muſcula*, and is diſtributed upon the muſcles of the neck. 3.

The fourth is the ſoporall, one on each ſide; ſo called, becauſe if 4.

they be ſtopped, ſleep doth immediately follow.

Theſe ſoporall arteries, when they are come to the throat, they are divided into two branches, to wit, the externall, which is leſſer, and the internall which is larger.

The externall beſtows twigs upon the muſcles of the face, upon the roots of all the teeth of the lower jaw, having entred into the cavity of the mandible, and going out upon the chin.

The internall branch, when about the throat it hath beſtowed twigs upon the tongue & larynx, about the lower part of the skull, it is divided into two branches; whereof the leſſer and hindermoſt accompanying the branch of the internal jugular marcheth toward the hindermoſt part of the skull, and entering at the ſecond hole of the nowle entereth into the hollowneſs of the *Dura mater*.

The formoſt & largeſt, when it hath entered into the cavity of the skull, through its proper hole in the

the parietal bone, and is come to the cell of the wedg-like bone, it maketh *rete mirabile*; which in beasts is large, but in man very obscure.

CHAP. VII.

Of the descending trunk of the Aorta.

THE descending Trunk of the *aorta* about the fifth *vertebra* of the breast bending towards the left side, marcheth downwards towards the last *vertebra* of the loins

In this march it sendeth forth sundry branches, which are these.

1. Intercostall inferior arteries in number eight. 2. *Phrenica* two, 3. *Cœliaca* one. 4. *Mesenterica superior*. 5. *Emulgentes* two. 6. *Spermatica* two. 7. *Mesenterica inferior*. 8. *Lumbares*.

The branches of the trunk descending

The inferior intercostall arteries accompanying the veins and nerves of the same denomination march according to the length of the lower part of the ribs, where

1. *The inferior intercostals.*

there is a hollowneſſe to receive them, and in the true ribs end, where the cartilages begin; but in the ſhort ribs they go a little further, even to the ſides of the lower belly.

Theſe ſend ſprigs by the holes of the nerves to the marrow of the back and to the muſcles, which reſt upon the *vertebræ* of the back.

By what way quittour and water is ſent from the breſt to the bladder.

Theſe not one afford ſpirits and blood to the intercoſtal muſcles, but carry alſo quittour and water gathered in the cavity of the breſt, ſent by the trunck of the *aorta* to the bladder by the emulgent arteries, according to *Spigelius lib. 6. cap. 4.* where *Fallopius* will have theſe matters to be ſent by *vena ſine pari*; but this is a ſhorter way.

2. Phrenicæ.

Phrenicæ are two, one on each ſide: they ſpring from the trunck as ſoon as it is come out of the cavity of the breaſt, and being ſpread into many twigs, whereof the moſt are beſtowed upon the lower part of the midriffe where the *vertebræ* of the back are; and ſome

some also upon the upper part, which afterward pass to the *pericardium* where it cleaveth to the midriff.

Cœliaca is one, so called, because it sendeth twigs to the stomack. This springeth from the fore-part of the trunck. This bestoweth branches upon the stomack, liver, gall, caul, the *duodenum*, the beginning of the *jejunum*, to a part of *Colon*, to the *Pancreas*, and spleen. 3. Cœliaca.

Mesenterica superior doth arise a little below the *cœliaca*, accompanying the *vena mesaraica*. It bestoweth many twigs upon the hungry and *Illium* gut; as also upon that part of *Colon* which lieth between the hollow part of the liver, and the right kidney. So that this branch is bestowed upon the upper part of the mesentery. 4.

The emulgent arteries are two, the right and the left. They spring from both the sides of the trunk under the former, where the first and second *vertebræ* of the loyns are coupled by a ligament. The left is lower then the right. These when 5.

when they are come to their kidneys, are divided into two branches, which are inserted into the cavities of the kidnys and by innumerable small twigs are spent upon the substance of the kidney. The use of these besides the common, is to discharge the serosity of the arteries, whereof they have great store.

6. *Spermatica*, or *seminales*, the Seminary; they are in like manner two, which spring from the forepart of the trunk.

The left artery doth not spring from the left emulgent artery as the vein doth. These marching downward, accompany the veins of their side. In men they are carried to the stones by the production of the *peritonæum*; but in women when they are come near to the stones, they are divided in two branches; whereof the one is bestowed upon the stones, and the other upon the bottom of the matrix, in the side of it.

7. *Mesenterico inferior*, it springeth about the *os sacrum* from the trunk

trunk a little above, before it sendeth forth the *rami iliaci*. It is bestowed upon the left part of the *Colon*, and the *rectum*; and accompanieth the Hemorrhoidicall veins to the *anus*.

Lumbares rami, the Loyn-branches, in number four: They spring hō the back part of the descending trunk of the *aorta*. These pass to the *vertebræ* of the loins, & their marrow by their holes, as also to the adjacent muscles. Some things here offer thëselves to be observed

1. That when either the colick is changed into the gout, or contrarywise the gout into the colick; if the last happen, then the humours are sent from the crurall arteries to the trunk, and from thence to the mesentericall branches of the arterys; & from thence to the guts. If the first happen, then the humours pass the contrary way. *Read Hip. 6. Epip. Sect.* 4.

2. If the colick turn either to a palsy, or falling sickness, as it may fall out according to *Æginet, lib. 3. cap.* 43. then the humour doth

doth return from the *Colon* by the meſenterical arteries, to the trunk, from hence to the *Lumbares*, which being filled compreſs the adjacent nerves, from whence difficulty of going enſueth; which may be called an imperfect palſey. If the falling ſickneſs be procured, the humour is ſent by the groyn-arteries and thence to the brain.

3. Clyſters may purge the whole body: for the clyſter moiſtning the whole *Colon*, may by the twigs of the arterirs draw noiſome humours from the trunck, and when purgation is cauſed by annointing but the navel (which often falleth out in uſing the unction for the pox) or vomiting by miniſtring a clyſter, wherein white Hellebore is, firſt the arteries draw the force of the medicaments, and this ſame faculty again doth purge by the arteries.

9. 9. *Arteriæ ſacræ*, or thoſe branches which go to the *os ſacrum*. They ſpring from the lower part of the trunk before it ſendeth out the *rami iliaci*. They are ſome-

what

what large. They marching downward, and leaning upon the *os ſacrum*, enter into the holes of it, and ſo paſs to the marrow, and hinder part of the ſame. By theſe the matter which cauſeth the cholick may paſs to procure the palſey of the legs.

Iliaca arteria, theſe ariſing below the former, about the lower *vertebra* of the loyns, mount above the vein, leſt it ſhould be hurt by the hardneſs of the *os ſacrum*, in their continual motion. 10.

They being in number two large branches, called *Arteria illiaca*, or flanck arteries, and marching downward to the thigh obliquely, they repreſent the Greek Λ Inverted. Theſe a little below the diviſion of the trunk are ſubdivided into two branches, to wit, the internall or leſſer *Iliaca*, and the externall or greater.

The internal hath two branches; The one is called *Glutæa*, and with a vein of the ſame denomination, is beſtowed upon the

the muſcles which make up the buttocks: The other is called *Hypogaſtrica*.

This is large; this being carried directly to the lower part of the *os ſacrum*, in men it beſtoweth twigs to the bottom and neck of the bladder, and to the ſtraight Gut; but in women, wherein it is larger it ſendeth plenty of twigs upon the bottom and neck of the matrix beſides the former parts. The externall or greater hath two branches.

The firſt is called *Epigaſtrica*. It ſpringeth from the outer part of the artery a little before it paſs thorow the *Peritonæum*; and turning upwards it mounteth upwards by the inner ſide of the ſtraight muſcle of the belly: and about the navill it is inoſculate with the *arteria* deſcending.

The ſecond is called *Pudenda*: This is but a ſmall branch, and when it is come out of the *peritonæum*; it paſſeth oblickly by the joyning of the *os pubis*, and is beſtowed upon the skin of the ſecret parts.

One

One thing is to be noted, that the *Arteria umbilicalis* ſpringeth from the internal *iliaca*; and going along the great artery, is firmly tied to the bladder by ſtrong membranes. *A note.*

When the child is in the belly, it is hollow; but without hollowneſs when the infant is born.

About the orifice of the veſſels, eleven valves are to be ſeen if the ventricles of the heart be diſſected tranſverſe near to the *baſis*. Of theſe ſome are called *triſulcæ*, and reſemble a barbed arrow; ſome *Semilunares*, or *Sigmoides*, becauſe they reſemble a half moon, or the Greek letter called *C*. Thoſe bend inwards, becauſe they are ſet before the veſſels which carry in blood. *The Valves.*

They bend outward, becauſe they are appointed for the veſſels which carry out the blood.

The *Vena cava* hath three *Triſulcæ*; but the *Arteria venoſa* two.

The *Aorta*, and *vena arterioſa* have three *Sigmoides*.

CHAP.

CHAP. VIII.

Of the parts similary, external parts.

Its appellation

Its figure

Its bigness

Its substance.

Its connexion.

HItherto of the vessels of the breast: Now follow the entrals, which are in the heart and lungs. The heart in Latine is called *cor*, from the Gr. word καρδία, from κραδία; so called by reason of the soveraignty which it hath above other parts of the body; or from κραδία, which is derived from κραδαίνεσθαι, because it is tossed with continuall motion: of figure it is *pyramidall*. The Ancients likened it to a Pine Apple.

As concerning its bigness, it is largar in man then in beast, if you consider the stature of his body. The external superficies of it is smooth, but within it is unequall, and hath many fibres.

The substance of it is fleshy, red, and compact. It is six inches in length, and four in breadth. It is tied above to the *mediastinum*, below

below to the *diaphragma* by means of the *pericardium*.

The parts of it are either dissimilary, or similary

Its parts.

Its dissimilary parts.

The dissimilary are two, to wit, *Basis*, or the head which is round and broad, and *mucor*, or *apex*, the small point, which doth bend towards the left side, and forwards under the left pap, where one may feel the motion of the heart.

The similary External

The similary parts are either external, or internal. The external are four, to wit, the fat, the membrane which covereth it, its vessels, and the ears. The fat is more copious in man than in beasts, chiefly in the upper part, where the vessels pass out.

1. *The fat.*

The membrane. The vein.

The membrane with the which the heart is covered, is thin, and cannot be separated from it. The vein whereof it is nourished is called *Coronaria*, because in figure it is like to the Crowns of the ancient Kings; for it compasseth the *basis* of the heart round about, and from thence sendeth branches to the whole substance of it even to the

the point of it. In the right side they are fewer and lesser; but in the left thicker & larger. This vein springeth from the ascending trunk of *vena cava*, a little before it entereth into the right ventricle.

The Artery.

Arteria Coronaria compasseth the *basis* of the heart, as the veins do, and sendeth sprigs to the whole heart, but chiefly to the left side. It springeth from the beginning of the *aorta* before it pass through the *pericardium*.

Nerves.

It hath nerves from the sixt conjugation, but smal; bestowed upon the *basis* near the *vena arteriosa*.

The ears.

The last external part are the ears, both because they are like to the ears of a dog, & are fastened to each side of the heart, as ears to the head. Their substance is nervous: they have three sorts of *fibres*, & are not much thicker then the skin. In figure they are pyramidal, somwhat sharp at the top: they are unequal both without, and within; yet they being full of blood, the externall superficies seemeth smooth. In number they are

are two; the right which is ſeated before the orifice of the *vena cava*, and the left ſeated before the *arteria venalis*. They differ; for firſt, the right is largeſt; ſecondly, the left is harder, more fleſhy, and thicker: thirdly, the left is more pointed and broad. The motion is contrary to that of the heart; for when the heart is dilated, they are contracted to expel, and contrariwiſe. The blood is firſt of all received and ſtaied in theſe ears, and for two reaſons. Firſt, that the whole heart ſhould not be too much ſtretched by the influx of blood, and ſo the dilatation and conſtriction of it hindered; as we ſee in a bladder too much filled with water. Secondly, that the veſſels would not burſt, and ſo when the heart is dilated, they are contracted; and ſoftly pour in the blood. They are two, becauſe veſſels which carry in blood to the heart, to wit, *vena cava*, and *arteria venoſa*; and becauſe the *cava* is larger then the *arteria venoſa*.

The

The substance of the ears is nervous, because they were to admit dilatation and constriction, The vein have a similunary valve to hinder the reflux of the blood, when the ear is contracted. The fat about the heart moisteneth it; and yet is not melted by the heat thereof, because it is suet and not grease.

CHAP. IX.

Of the similary internal part.

THe internall parts of the heart are the two ventricles, the right and the left, and the *septum*.

Of the Ventricles.

The ventricles do differ in these points. 1. in bigness; so the right is much bigger then the left; for it reacheth from the *basis* to the *mucro*. 2. in the blood contained; for the blood in the right ventricle is venal, but in the left arterial. 3. In figure for the right is semi circular, but the left orbicular.

How the Ventricles differ.

4. the

4. the left ventricle is placed exactly in the middle of the heart: for the right seems only to be an appendix, set onely to the side. 5. The left ventricle is of a more solid and compact substance, and is three times thicker then the right. 6. The right ventricle was appointed by nature to minister nourishment to the lungs; but the left to be a store-house of vitall blood whereby it is communicate to the whole body. If you dissect the heart according to the longitude from the *basis* to the point, you shall find the internall superficies very unequall, full, as it were, of pits; yet the left ventricle is most unequall. In both these ventricles you may note some fleshy fibres springing from the *mucro* of the ventricles, which becoming membranous, fibres are inserted into the lower parts of the valves. There are five in the right, but in the left two onely, yet more thick and solid.

The action of the heart.

The action of the heart is called *pulsation*. The cause of this is a peculiar

peculiar faculty granted to the heart, flowing from the form of of it. The pulsation hath two motions, dilatation and constriction.

Dilatation. In dilatation the *mucro* is drawn to the *basis*; for so it becometh spherical and more capable. In this motion it draweth blood to it self from the trunk of the *vena cava*. This motion is performed when the straight fibres are contracted, and the transverse relaxed.

Constriction. In constriction the *mucro* doth fall from the *basis*, and so the heart becometh narrower, by this motion the vital blood is expelled out of the heart. This motion is performed by the constriction of the transverse fibres. Between these contrary motions, we must imagine some rest.

The Septum. These ventricles are divided by the *septum*, which is nothing else but the right wall of the left ventricle; wherefore the right side is bunched, but the left hollow. It is unequall as the ventricles.

The

The pits are not permeable, and so no blood can pass through the *septum*, from the right to the left ventricle.

CHAP. X.

Of the frame of the Lungs.

THe second intrall of the breſt, to wit, the Lungs follow, called in Latine *Pulmo*, and in Greek πνεύμων; becauſe they are the inſtruments of breathing: we are to conſider their frame and action.

As concerning their frame, theſe things are to be marked. 1. The ſubſtance. In a man it is of the colour of a Roſe, ſpongious and light, ſo that it ſwimmeth in water: but in a child in the womb it is redder, harder, and heavier, and doth ſink in water; becauſe it is fed with venal blood, derived from the *vena cava* to *arteria venoſa*, by *anaſtomaſis*. *Its ſubſtance.*

1. The Lobes, they are ordi- *Its lobs.*

narily two, sometimes three. If there be two, the upper is shorter then the lower. They cleave together by membranous ties: are like to the horn of an Ox; for towards the brest they are bunches, but towards the back hollow.

Its membrane. The lungs are covered with a membrane. It is framed of the common coat of the vessels, which are bestowed upon the lungs. It is thin, soft, and very porous, to give way to noisome matters, which sometimes are carried to the *aspera arteria*, to be voided by spitting.

Its vessels. 3. As for its vessels; veins it hath from the *vena arterialis*, which passeth out of the right ventricle of the heart. Arteries it hath from the *arteria venosa*. The first bestows nourishment, the second, life. As soon as they touch the lungs, they are divided into two branches, and those into more, untill at last they end into thredlike twists. It is fed neither by the *vena cava*, nor

not *porta*; becauſe the blood contained in theſe is too groſs; for they require for nouriſhment a blood, between venall and arteriall, which is not ſeen in any other part of the body. The blood is carried from the right ventricle of the heart, from the *vena arterialis* to the *arteria venalis*. And ſo the hot blood of the left ventricle is cooled; as the mean boyling of a pot is ſtayed by powring in ſome cool water. It hath a ſmall nerve from the ſixth conjugation which goeth no further then the membrane which affordeth but a dull feeling.

The cooling of the blood of the heart.

4. The wind-pipe remarkable is in Latine *aſpera arteria*. It is called an artery, becauſe it receiveth in the air by inſpiration: *aſpera*, becauſe its ſubſtance is unequall.

The Winde-pipe. Its denomination.

It may be thus deſcribed: It is a long pipe framed of round cartilages, tyed together by membranes: ever open, which beginning at the lower part

Its deſcription.

of the throat, and resting upon the mouth of the stomack, is implanted into the lungs by many branches. It hath two parts; the upper which is called *larynx*; and the lower, which is called *bronchus*. In the upper part there is a chink that the air passing through a narrow passage might cause a sound. The instruments of the voice are moistened by the glandules, to cause the clearer sound.

Its parts.

The rima

Its frame,

The wind-pipe is not all together cartillaginous; for so it could have been dilated; nor altogether membranous; for then it would have shrunk together whereof the cartilages are tied together by membranes. These cartilages are like to the Greek *C*. The wind-pipe then beginning under the annular cartilage of the *larynx*, it passeth downward straight-ways, becoming by degrees smaller, it cleaveth by a membrane to the mouth of the stomack: and about the fourth *vertebra* of the breast, it is divided

vided into two branches, the right and the left, which enter into those side: of the lungs; and so the branches encrease and grow lesser, untill at the last they end by small twigs, about the superficies of the lungs. They are called *bronchia*. These are framed of a whole circle, being round. These are placed between the branches of the *vena arterialis* and *arteria venalis*, to cool the blood: The artery being in the fore-part, the vein in the hinder. Bronchia

It hath veins from that branch of the externall jugular, which passeth to the mouth. Arteries it hath from the great and deep branch of the soporal which passeth to the throat. Nerves it hath from the sixth conjugation, called *recurrentes*; because having marched downward, they turn up again to the muscles of the *larynx*. Two pair of glandules are placed at the sides of the *larynx*; the first pair is seated at the sides of the *uvula* about the root of the tongue. Its vessels. Glandules.

They are covered with the common membrane of the mouth; they receive the ſuperfluous hrmidity of the brain, and turn it into ſpittle. They are called *tonſillæ*, and by Chyrurgions *amygdalæ*.

The ſecond pair in the lower part of the *larynx* reſt upon the buckler-like cartilage. Theſe in women, by reaſon of their moiſt temperature ſwelling, cauſe their necks to be round, whereas in men, chiefly of a dry complexion, they becoming lank diſcover protuberance of the fore-part of the *larynx*, which is called *pomum Adami*.

Its membranes.

It hath two membranes; one external and thin from the *pleura*, cleaveth faſt to the ties of the cartilages.

The parts of breathing.

The other internall from that which covereth the roof of the mouth, of a thicker ſubſtance, having ſtraight fibres, and bedewed with an unctuous humour to withſtand ſharp rheums, of an exquiſite ſenſe; ſo that if but a crum chance to fall into it, it will be like to ſtrangle one. CHAP.

CHAP. XI.

Of the action of the lungs.

THhe action of the lungs is called *respiratio*, or breathing: this is nothing else but the taking in and letting out of the air by the wind-pipe, that the heart the wel-spring of the vital heat may be cooled.

Breathing is performed by two actions; to wit, inspiration and expiration. Inspiration is performed when the lungs are dilated, for then the air is drawn in; but expiration happeneth when the lungs are contracted, for then the air is compelled.

The blowing of a pair of bellows doth express these actions, Dilatation is caused by the elevation of the brest, but contraction by falling down of the brest. The brest is dilated by the eleven external intercostall muscles, all which perform the office of one muscle. These arise from the upper rib, and end by an

oblique paſſage in the lower rib. The breſt is contracted by the eleven internall intercoſtall muſcles; contrary to the former in their beginning, inſertion, and office: they croſs one another in form of Saint *Andrew's* Croſs; ſo that the motion of the lungs doth proceed from the motion of the breſt. The connexion of the lungs doth make this manifeſt; for above they are faſtened to the neck and back by the wind-pipe; in the forepart to the *ſternum*, behind to the *vertebræ*, by the *mediaſtinum*; below to the midriff by ſome *fibres* which ſpring from the upper membrane of the *pleura*.

CHAP. XII.

Of the neck.

THis part is called *Collum*, not a *Colendo*, becauſe it uſed to be adorned with chains; but becauſe it riſeth from the ſhoulders *inſtar collis* like a hill, it

Its denomination.

it comprehendeth the diſtance bewen the head and breſt. It was framed for the wind-pipe and mouth of the ſtomack.

The parts of it are either containing or contained. The containing are the ſame which are found in the reſt of the body, ſaving that the *membrana carnoſa* ſeemeth to be fleſhy. *Its parts Containing. Contained.*

The parts containing are theſe

1. The *larynx* which is the upper part of the wind-pipe. When the gullet bendeth downward in ſwallowing, this ſtarteth upward to give way to ſwallowing.

It is framed of five cartillages: *The cartilages of the larynx.*

1. Is *cutiformis*, or buckler-like; for within it is hollow, but without imboſſed; that part which ſticketh out is called *pomum Adami*, and is greater in men than in women. 2. Its *Annularis*, becauſe it is like a Turkiſh ring, and compaſeth the whole *larynx*; in the hinder part it is broad and thick.

3. And 4. Its *Guttalis*, because it resembleth the neck of an ewar: this is double. They have upper and lower processes; the upper are soft, flaggy, bending outwards, being joyned together they are like the neck of an ewar: They make up the *Glottis*.

Glottis.

5. Is the upper part, and within the *Scutiformis*. It is soft and called *Epiglottis*, because it is placed above the *glottis* or chink, and covereth it. It is of the form of a tongue. It is appointed to hinder the falling down of any thing which may prove offensive unto the wind-pipe when we eat or drink. It is pressed down by the weight of the things which are taken by the mouth, and turneth them down to the *gula*. Being suspended by a ligament, being pressed down it riseth up immediately. 2. Part contained in the mouth of the stomack. It is called *Pharinx* from φάρυξ, because it conveyeth the meat and drink to the stomack. It is fleshy.

Epiglottis.

Pharynx.

The

The attraction of it is performed by the ſtraight; but the expulſion by the orbicular fibres. 3. Is the *uvula*: It is a red, fleſhy, and fungous ſubſtance. It is covered with the red application of the skin of the roof of the mouth. 4. The ſoporall arteries. 5. The internall jugular. 6. The recurrent nerves between theſe: of all theſe parts the *larynx* is framed of the voice. The remote inſtruments of the voice are the breſt and lungs. The nearer, either prepare as the wind-pipe, or help as the ſinews and muſcles; or keep it as the throat or mouth, or immediately form the voice, and that is done by the *Glottis*; for the air being forcibly blown out of the lungs, it beating upon the chink ſhut reaſonably, procureth the voice.

Uvula.

The ſoporall Arteries. The internall jugulars. The recurrent nerves. The inſtruments of the voice.

The living creatures which make no voice have no neck, as fiſhes. The *uvula* cauſeth the pleaſant ſound of the voice: beſides it hath theſe uſes: 1. It ſtayeth the air a little, that it paſs

What living creatures have no voice.

pass not cold and impetuously to the lungs. 2. Like a fan it putteth back dust, and such like bodies. 3. It hindereth the going of liquid things to the nose. If it be deficient, the voice becometh unpleasant; and the lungs are cooled and made apt to receive defluxions, by the which they are ulcerate, and so *tabes* procured.

THE

THE THIRD BOOKE, OF THE HEAD

CHAP. I.

Of the common parts containing.

NOw followeth the third great venter of the body, called *Caput*, the head; because the senses and nerves take their beginning from thence. *Its denomination.*

It is placed in the highest region most fit for the senses, but chiefly for the eyes; for they ought to be placed there as in a watch-tower; and they having but soft sinews which could not endure a long passage, it *Its seat.*

was

was requisite that the brain should be at hand.

Its figure Of figure it is spherical; yet somewhat flattish and long.

Its parts. The parts are of three sorts, for they are distinctive or expressive of the regions, or constitutive of the whole.

The parts distinctive are two, the hairy scalpe called *calva*, and that without hair called *facies*. The parts which express the regions, are four: 1. *Sinciput*, or the fore-part reaching from the forehead to the coronall suture. 2. *Occiput* the noddle, or hinder part begining at the suture *Lamdoides*, and reaching to the first *vertebra* of the neck. 3. And 4. are called *tempora*, or the temples. The laterall parts between the ears and eyes.

The parts constitutive are either containing or contained. The containing are either common or proper. The common are *cuticula cutis*, and *membrana carnosa*: the *cuticula* is thinner and softer; but the skin thicker then

then in any other part of the body, yet *porous* to give way to the nourishment of the hair. The *membrana carnosa* in some it so cleaveth to the whole skin, that they can move all the skin at their pleasure: fat was not requisite, lest it should have hindered the discharging of the fuliginous vapours, and caused the heat to be too big.

CHAP. II.

Of the Hair.

SEeing the skin is garnished with hair, I will discourse briefly of it. A hair is a body, cold and dry, small, thred-like, hard and flexible budding from the skin. The hairs are not round but four square, as the stalks of some plants. This may be discerned if a hair be put into the optick instrument, called *Jack in a Box*.

Its denomination.

Its figure.

A hair hath three parts, one outward, which will admit cleaving

The parts of it.

cleaving: The middlemoſt flexible; and lowermoſt, which is called the root. It is white and beſet with a mucous ſubſtance, by the which it cleaveth to the skin.

The matter. Hairs are produced, not of the fuliginous excrements of the brain, but of blood drawn by the roots and beſtowed upon the trunks. As the feathers in fowls are produced; for if you pluck out any from very young ones, you ſhal manifeſtly ſee that blood doth both produce and feed the hair.

The ſubſtance The ſubſtance of the hair is compact, ſolid and hard, apt to be cleft according to the length, and laterall flexible.

Their colour. The colour of them is anſwerable to the naturall conſtitution of the party. They are moſt commonly ſtraight in thoſe which are born in cold countries, but curled in thoſe who inhabit hot climates.

Their bigneſs. They are ſhort and thin in infants, longer and harder in men,

men, but longest in women.

The hairs have four uses; for they serve for defence and beauty, and serve for the expulsion of fuliginous vapours, and show the temperature of the whole body and skin.

CHAP. III.

Of the proper containing parts.

THe proper containg parts are four; to wit, the muscles, the *pericranium*, the *cranium*, and the *Meninges*: Look for the muscles in the treatise of the muscles, and for the *cranium* in the doctrine of bones.

The Pericranium.

The *pericranium* is a membrane thinnish and white, immediately seated under the *membrana carnosa*. It covereth the whole skul, except where the temporall muscle lieth upon the *cranium*. It being stretched over the temporal muscle doth firmly bind it. And seeing it is most tender, it causeth horrible pain

pain and inflammation, when the temporall muscle is wounded. There is no *Periostium* besides it, yet it is double; and being of competent thickness, it may be divided: as all membranes of the like nature.

The Periostium.

Its connexion.

It is tied to the *dura mater* by some nervous fibres which pass within the skull, to stay firmly the *dura mater*, and so the brain from inordinate moving. And although in infants new born these be strongly united; yet in the process of time they part, and become joyned onely by some fibrous tyes; from it to the brain by these inflammations may be communicated.

The meninges

The Menninges follow called by the *Arabians*, *motres*; as if all the membranes of the body were propagate from them: they are two in number, the *dura* and *pia mater*. The *dura mater* having in the upper superficies of it many veins, it represenreth the leaf of a Figtree. It is a little distant from the skull, to give way

Dura mater.

way to the motion of it. It hath two membranes; the upper towards the *cranium* is harder, tougher and less sensible; because it was to touch the hard skull.

Pia mater.

The lower is smooth, slippery and as it were, bedewed with water: It hath its beginning from the *basis* of the skull, unto the which it cleaveth firmly. It hath connexion with the skull and *dura mater* by nervous fibres. It hath a threefold use. 1. It wrappeth in the brain, and the sinews proceeding from it, and is a defence unto them. 2. It divideth the brain from *cerebellum*. 3. It divideth the brain it self in two parts, the right and the left. This division, by reason of the figure of it, being broader in the hinder part; and by degrees growing narrower is called *falx* or, the *sickle*.

Pia mater.

Tenuis or thin *meninx*, or *pia mater*; It immediatly covereth not only the uppermost parts of the brain, but the inner cavities in like

like manner. It receiveth from the *crassa meninx* innumerable branches of vessels, and bestoweth them upon the brain.

It hath two uses; First, it keepeth the soft substance of the brain from running abroad. Secondly, it cloatheth the *cerebrum*, *cerebellum*, and the sinews. It is of an exquisite sense to observe such things as might hurt the brain.

CHAP. IV.

Of the nature of the Brain.

The colour of the brain.

THE *Pia mater* being taken away, the brain offereth it self: Which in colour is white, that the animall spirits might be clear; which otherwise in a dark place of another colour would become lesse clear and troubled.

Its substance.

The substance is thick, viscous, soft, and white. It is not a glandule, for it is the seat of the animall

mall ſpirits; but glandules are appointed to receive exremenitious humours, and it is more curiouſly framed then any glandule, neither is it of a marrowy ſubſtance; for marrow ſwimmeth in water, but this ſinketh. Beſides, marrow nouriſheth the bones; but the brain nouriſheth no part. The ſubſtance of it differeth from all other parts of the body; as the ſtones do.

Its bigneſs.

The ſubſtance of it doubtleſs, is a *parenchyma*, a ſubſtance oft uſed about the beginning of the nerves; as that of the heart and liver are.

A man of all other living creatures hath the biggeſt brain; for it weigheth four or five *lib.* in ſome; and is as big again as an Oxe brain: for by reaſon of the multitude of the animall function, plenty of ſpirits is required, which cannot be procured but by great ſtore of blood which cannot be contained within a narrow place.

The outer circumference is full of

The figure of the uttermost circumference.

of windings, as the guts are; that the veſſels being in theſe, as furrows, might ſafely be carried throughout the ſubſtance of the brain to nouriſh it.

CHAP. V.

Of the upper region of the Brain.

THe brain hath three parts, *cerebrum*, that which properly is called the brain: the *cerebellum*, the little brain: and that part of the beginning of the *ſpinalis medulla*, which is within the skull.

Its difference from cerebellum.

The brain differeth from the *cerebellum*, firſt, in ſubſtance; for it is ſofter; ſecondly, in colour, for it is whiter; thirdly, in bigneſs, for it is three times as big; fourthly, in cavities, becauſe it hath many.

The brain hath three regions: the upper which is varicous; the lowermoſt which is called *baſis*; and the middlemoſt. The upper part

part is divided into two parts, by the ſicle-like proceſs; to wit, the right and left. In it there is a two-fold ſubſtance; for the upper part of it is ſofter, & of an aſh-colour.

If you take away the three inches broad of this ſubſtance, then *corpus calloſum* will appear; which is nothing elſe but the whiteſt and moſt ſolid ſubſtance of the brain. Corpus calloſum

About the bottom of this diviſion of the brain, there appeareth a white ſubſtance, if you bring the ſides gently together with your finger; wch is called *ſceptum lucidum*. It is looſe any wrinkled; but if it be ſpred abroad, it appeareth clear. It cleaveth above to the *corpus calloſum*, but below to the *fornix*. Some will have it to be a reduplication of the *pia mater*; others a portion of the brain. Under the *corpus calloſum* the *fornix*, or vault is ſeated, of the like ſubſtance. In the upper part it is arched; but in the lower part *convex*, in figure it is triangular. It holdeth up the Septum lucidum. Fornix.

the weight of this upper region from bearing down the subjacent part.

CHAP. VI.

Of the middle region of the brain.

Three number. The anterior.

UNder the *testudo*, first, the ventricles are seated, called *sinus*. They are accompted four in number, whereof two are anterior, to wit, the right and left; they are severed by *septum lucidum*. In the inner part they are covered with a membrane of an exquisite feeling, having its beginning from the *infundibulum* ascending. Between these *sinus* and the *fornix* there are two textures of vessels, one on each side, framed of the complication of smal veins tied together by a thin membrane. They are called *plexus chorioformes*: Because they are like to the membrane wherewith the child in the womb is wrapped, called *Chorion*,

The

The third ventricle is nothing else, but the meeting of the former two, towards the hinder part. In it there are two passages: the first in the fore-part, which marcheth streight-wayes down to the *infundibulum*. The second passeth under the *testes* and *nates* to the fourth ventricle. About this there is a chinke called *vulva*.

The posterior.

The *infundibulum*, or funnel, is a certain cavity under the third ventricle framed of the *pia mater*, which becoming narrower representeth a funnel. It endeth in the *glandula pituitaria*, which receiveth the flegme falling from the ventricles of the brain. It is placed in the four-square hollownesse of the wedge-like bone.

Infundibulum.

Glandula pituitaria.

About this glandule, about the sides of the aforesaid cavity there is a membranous twisting framed of innumerable twigs of arteries; which spring from the largest branch of the soporal artery, which passeth by a proper

hole in the bones of the temples into the capacity of the *cranium*: It is called *rete mirabile*, representing a net spread abroad.

Rete mirabile.

Here, of the pleasant breathing of the blood, natural sleep is caused; but if the arteries be too full, a deep sleep is caused. if you blow up the soporal artery in the neck, they will be blowen up also. Then the *infundibulum*, *glandula pituitaria* and *rete mirabile* are seated in the lowest region, or basis of the brain.

4. *Ventricle.*

The fourth ventricle is placed between the lower part of the *cerebellum* and the beginning of the *spinalis medulla*; and because it being round endeth in a narrow point, it is called *calamus scriptorius.*

Calamus scriptorius.

The chink is caused of the division of the root of the *spinalis medulla.*

About the hindermost hole of the third ventricle which passeth to the fourth ventricle, certain round bodies appear, small portions

tions of the brain, having their denomination from those things which they resemble. The first is *glandula pinealis*, or *penis*; because it representeth the Pine-Nut, or a Prick. It is seated in the beginning of that pipe by the which the third and fourth ventricle are united. Neer to this on both the sides of the third ventricle four round bodies appear. The two upper are less r, and are called *testes*: the two great bearings out are called *nates*. The chink between the *nates* is called *anus*. The use of these ventricles is to carry safely the venal blood; for it was not safe for the veins to be carried through the soft substance of the brain; lest the veins being compressed by the weight of it, the passage of the blood should have been hindered.

Penis.

Testes.
Nates.
Anus.

The use of the ventricles

Nature hath placed the ventricles aloft, because the blood being heavy is apt to pass down of it self. From the third ventricle innumerable veins pass by

the windings of the brain to the inner substance of it. In these ventricles onely the venal blood is contained, carried thither by the internal jugulars, which end at the beginning of the lateral ventricles.

CHAP. VII.

Of the Cerebellum.

Its seat.

THE second part of the brain is called *Cerebellum*, or the little brain. It is seated in the hinder part of the head or skull, unto the which it cleaveth by the two membranes wherewith it is wrapped. It differeth from the brain in sundry points. First, in substance: for it is harder. Secondly, in bigness; for it is scarce so big as the third part of the brains. Thirdly, in figure; for it is more flat than round. Fourthly, in cavities; for within it is not hollow. Fifthly, in colour, for it tendeth to a yellowish gray colour.

How it differeth from the brain.

It

It is framed of four parts, whereof two are lateral; the right and the left: these are spherical: two are in the middle; to wit, the foremost and hindermost. These are round.

Its frame Processus vermiformes.

They are framed of sundry orbicular portions; and because they are like unto the wormes which are in hollow timber, they are called *processus vemiformes*, wormlike *processus*.

The one is in the fore-part of the fourth ventricle; the other in the hinder part.

Their use is to hinder the beginning of the cavity of the *spinalis medulla*, by the *cerebellum*.

Their use

CHAP. VIII.
Of the Spinalis Medulla.

NOW followeth the third part of the brain, called *spinalis*, or *dorsalis medulla*.

Its name.

The substance of it is not double, as it is in the brain, but uniform, white, and compact;

Its substance.

as it groweth in length it becometh more and more hard.

Its parts. It hath two parts; *viz.* that which is contained within the brain, and that which is kept within the *vertebræ* of the backbone. That which is within the skull is about four inches in length. That which is without and beginneth at the great hole, reacheth to the *Coccyx*, growing ſmaller, and ſmaller, until at laſt it end in many ſmall twiſts, which reſemble a horſe tail.

Its membranes. It hath three membranes. The firſt is that which immediately toucheth it. This ſpringeth from the *dura mater*, and paſſeth between both the parts of it. The veſſels which afford nouriſhment and life, paſs alongſt this membrane. The ſecond covereth this, and ſpringeth from the *dura mater*. There is no diſtance between, as is ſeen in the brain, but one toucheth another. The third proceeding from the ligament which joineth together the *vertebræ*, covereth both theſe.

It

It is divided all along, as it were by a long ſection, until you come to the *vertebræ* of the loins: you may ſeparate theſe parts by boiling, for then they will fall aſunder. This diviſion is the cauſe that ſometimes one ſide onely is paralytick. The *ſpinalis medulla* in figure is round. *Its diviſion.* *Its figure.*

It ſpringeth both from the *cerebrum* and *cerebellum*. Two roots it hath from the fore-part of the braſn, about the middle of the ventricles: theſe are in the fore-part, and bigger, and are called *nates*. It hath two in like manner which are leſſer, and are called *teſtes*. They ſpring from the lower part of the *cerebellum*. Theſe marching towards the back-part, meet together, and make the *ſpinalis medulla*. *Its beginning.*

The hinder trunks are clipped with a proceſs; which by *Rawſus* is called *pons cerebelli*.

The cavity between the *cerebellum*, and the *ſpinalis medulla* [illegible] compaſſed the fourth ventricle, as the vacuity between the *nates* *The common errour concerning the ventricles of the brain.*

and *testes* the third, but erroneously; for they are not within the substance of any part of the brain; but are of a necessity caused by reason of the parts aforenamed: So that in truth there are but two ventricles, or rather one parted by the *septum lucidum*; yet for doctrines sake four ventricles are set down.

CHAP. IX.

Of the actions of the brain.

THE action of the brain is this: After that the spirits and blood are discharged into the *Sinus* of the *dura mater*, by the veins and arteries, to temper the heat of them, the brain is ordained (seeing it is colder then the heart) that the animal functions, which are feeling and moving may be the more readily executed.

Wherefore the animal spirits seem not to differ from the vital spirit, in substance, but in qualities;

ties; to wit, the temperament and attenuation; for they must be more temperate, because heat doth both taint the reason (as we may see in drunkenness and raving) and hindereth or perverteth the motion.

Whether the animal spirits differ in substance from the vital. Why they ought to be temperate.

The spirits ought also to be more subtil; because they are to pass, like a thunder, through the bodies of the nerves. So as the vital spirits are carried to the parts of the body by the arteries, so the animal are carried by the nerves.

And subtil.

The animal spirits for this cause also ought to be subtil, because the reasonable soul is resident in the brain which doth contemplate things immaterial, as Angels and it self.

The place of the reasonable Soul.

CHAP. X.

Of the sinews proceeding from the brain, and first of the first pair.

Eeight pair of sinews proceed from the brain.]

SO much then of the substance of the brain; It follows then that we shew the sinews which proceed from it; of them there

are eight pair comprehended in these verses:

Optica prima; oculos movet altera; tertia gustat:
Quarta, & quinta audit; vaga sexta; at septima linguæ est;
Octava olfactum regit, aere naribus hausto.

The first pair. The first pair, the *optici* or *visorii nervi* make; these bestow upon the eyes the faculty of seeing. They spring from the beginning of the trunks of the *spinalis medulla* in the nowle. They march on from thence drawing neerer one to another, until they meet at the cell of *Os sphænoides*; where they are united, not by simple touching, or intersection, but by confusion of their inner soft substance. These of all the rest are biggest & thickest, but softest. In their beginnings they are softest, but become harder, that they may pass the more securely so long a way.

These are hollow until they be united,

united, then the hollowneſs cannot be diſcerned. This hollowneſs may be ſhewed in a large beaſt newly killed, and in a clear light. After their unition they are ſeparate, and each of them, paſſing through the firſt hole of *os cuneiforme*, obliquely are inſerted into the center of the eye.

The hollowneſs of the optick nerves.

Their inſertion.

Theſe nerves have two membranes, and the inner ſoft marrowy ſubſtance. The membranes ſpring from meninges. The inner ſubſtance from the body of the brain.

Their Membranes, and marrowy ſubſtance.

Theſe nerves cannot be divided into many twiſts, as other nerves are, but frame the tunicles of the eye; for the *cornea* both proceed from the thick membrane, the *uvea* from the thin membrane, and the *retina* from the marrowy ſubſtance.

The uſe of theſe nerves.

CHAP.

CHAP. XI.

Of the second and third Pair.

The second pair Its beginning. Why both the eyes are directed to the same object.

THE second pair is termed *motorium oculorum*, because it moveth some muscles of the eyes. It hath its beginning about the innermost part of the beginning of the *spinalis medulla*.

The sinews are so united where they spring out, that they make a common corner, which is the cause that both the eyes turn to the same parts.

Its substance.

It is smaller and harder then the former, and cometh out of the skull by the second hole of *os cuneiforme*, which is long; and so entereth into the orbick of the eye.

Its sprigs

It hath sundry sprigs: the first mounting above the optick, it is bestowed upon the attollent muscle, and the eye-lid. The second easy to be seen is bestowed upon the adducent muscles by sundry small twigs. The third by many *fibres* is inserted into the

the depriment muſcle. The fourth is inſerted into the leſſer oblique muſcle about the outer corner. So that this pair onely moveth four muſcles.

The third pair. Its beginning, marching and inſertion.

The third pair proceedeth from the lower part of the root of the *ſpinalis medulla*, in the beginning, being very ſmall; from thence it marcheth directly forward under the *baſis* of the brain, accompanying the ſecond pair, with the which it paſſeth through the ſecond hole of the wedg-like bone, and entereth into the orbit of the eye. Then it is divided into four branches: the firſt beſtoweth a branch upon the greater oblique muſcle, which hath the *trochlea:* Then paſſing through the hole of *os frontis* above the orbit, it is beſtowed upon the muſcle of the eye-brow and the skin. The ſecond marcheth downwards, and paſſing through the hole of the upper jaw-bone, which is under the orbit, is beſtowed upon the muſcles opening the upper lip and noſtrils, as

Its branches.

as alſo the gums of the inciſory teeth of the lower gum. The third paſſing by the hole of the ſecond bone of the upper jaw which is under the caruncle of the great corner, is beſtowed upon the inner membrane of the noſe. This being very ſenſible cauſeth ſneeſing if any ſharp thing toucheth it. The fourth cometh out of the fourth hole of *os ſphanoides*, which is the chink neer to the outward corner of the eye, and goeth to the inward part of the temporal muſcle. This beſtoweth the faculty of moving to the fore-named muſcle.

The cauſe of ſneezing.

CHAP. XII.

Of the fourth and fifth pair.

THE fourth pair ſpringing neer the place of the former, paſſeth through the ſixth hole of the wedge-like bone; and paſſing downward, it is divided into three branches; the firſt being twiſted, it is united into two twigs of *nervus auditorius*

The fourth pair.

Its branches.

torius, and is bestowed upon the muscles of the cheeks and lower jaw. The second is inserted into the gums of the grinders of the upper jaw. The third entereth into the hollowness of the lower jaw, and bestoweth a twig to the roots of all the teeth. It endeth in the skin of the lower lip, and the membrane of the tongue neer the root. Ordinary Anatomists make but one pair of these two last, and set it down their third; but these two are united neither in their beginning nor insertion.

Its ending.

The fifth pair proceedeth from that place where a portion of *cerebellum* is united to the brain, lengthned by two nerves, whereof the one is softer, the other harder. These pass out of the membrane together; and by the hole of *os petrosum* enter into the wreathed hollowness of the ear.

The fifth pair. Its beginning.

The harder sendeth twigs to the throat, nostrils, and a twig to the tongue, by reason of this twig they that are born deaf prove also dumb.

Its twigs. Why they that are born deaf prove dumb.

The

The ſofter nerve, when it is come to the firſt cavity of the ear, it covereth it like a membrane; and truly may be called *nervus auditorius*, ſeeing it doth afford the ſpirits to the hearing.

CHAP. XIII.
Of three other Pairs.

The ſixth pair. Its inſertion.

THE ſixth pair is called *vagum*, becauſe it beſtoweth branches upon ſundry parts; and amongſt the reſt, to all parts of the belly which require feeling; for theſe being ſoft parts did not require hard ſinews from the *ſpinalis medulla*.

Its beginning.

This ariſeth from the hinder and lower part of that place, from whence the former ſprung, by many ſmall twigs. Theſe make up two diſtinct nerves, which are covered with one membrane borrowed from the *dura mater*. So joined, they paſs through the ſecond and third hole of the nowl, by the which the

the leſſer branch of the ſoporal artery, and the greater of the jugular enter into the skull.

Its branches.

The leſſer of theſe branches is ſeated more forward, and when it is come out of the skull, it is ſpent upon the muſcles of the throat and tongue, and the parts contained within the mouth. The greater is ſeated more backwards. This before it enter into the breſt; above the throat it is divided into two branches; to wit, the exterior, which is leſſer, and the interior, which is greater.

Their recurrent nerves.

From the exterior thoſe nerves do ſpring, which are called *recurrentes*, or *reverſivi*, becauſe they deſcend and aſcend again; and *vocales*, becauſe they being cut, hinder the voice.

Of theſe the right is winded about the axillar artery, as about a pulley. The left is wound about the *aorta* deſcending; afterwards mounting up, they are inſerted into the beginning of the muſcles of the larynx, which are in the lower part. This ex-

exterior is bestowed upon the parts of the middle cavity. The Interior branch is bestowed upon the parts of the abdomen. The right sprig serving for these on the right side, and the left serving those in the left.

The seventh pair.

The seventh pair, which affordeth moving and feeling to the tongue, is hardest of all.

Its beginning.

It hath its beginning where the *cerebellum* endeth, and *spinalis medulla* beginneth.

Its frame

In its beginning it hath divers sprigs, which afterward are united and pass through the fourth and fifth holes of the nowl; which are placed between the great hole, by the which the *spinalis medulla* passeth; and that out of which the sixth pair issueth. As soon as it is come out, it is united to the sixth pair by a membrane. When it is come to the root of the tongue, it bestoweth most branches upon the muscles of the tongue, but fewest upon those of the *larynx*.

The eighth pair may be called *Olfacto-*

Olfactorium, because it serveth for smelling. They arise at the hinder sides of the brain, which are above the holes of hearing. They are sharp in their beginning, and separate: They end in the *processus mammillares*, or *papillares*. In number they are two, white, soft, broad, long. In man they are but small; but in beasts of exquisite smelling (as Hounds) large.

The eighth pair.

CHAP. XIV.

Of the nerves of the spinalis medulla; and first of the nerves of the Neck.

OUT of the *spinalis medulla*, which is nothing else but the production of the *cerebrum* and *cerebellum*, by the *vertebræ* of the back do spring all the sinews which move all the other parts of the body.

What it is.

The *spinalis medulla* hath three membranes, two as the brains, one harder, the other softer, and the

Its membranes.

The Nerves which spring from it.

the third membranous & strong, which *Galen* took to be the ligament of the *vertebra*. From it doth spring thirty pairs of sinews; seven of the neck, twelve of the breast, five of the loins and seven from the holes of *os sacrum*.

The first pair.

The first pair of the fore-part cometh out between the nowl-bone and the first *vertebra* of the neck, and is bestowed upon the muscles which bend the neck which lie under the *œsophagus*. In the hinderpart it cometh out of the hole, which is common to the nowl-bone and the first *vertebra* of the neck.

Its twigs.

It hath two twigs: The smaller is bestowed upon those which stretch out the neck. The bigger is inserted into the beginning of the muscle which lifteth up the shoulder-blade.

The second pair.

The second pair in the fore-part, where it is smallest, it commeth out between the second and third *vertebra*, and is bestowed upon the skin of the face. In the hinder part it cometh out at the

the ſides of the proceſs of the ſecond *vertebra*, but preſently it is parted into two twigs. The thicker is beſtowed upon the whole skin of the head even to the crown. The ſmaller is beſtowed upon greater, ſtraight, and the lower oblique muſcles which ſtretch out the head.

The third pair.

The third pair cometh out of the lateral hole, which is between the ſecond and third *vertebra*, and immediately is divided into two branches; whereof that which is in the fore-part, hath four twigs: the firſt cometh to the long muſcle; The ſecond is beſtowed upon the muſcles which lie under the *œſophagus*; the third goeth to the skin of the back-part of the head. The fourth is beſtowed upon the tranſverſe muſcles of the neck, and the muſcle which lifteth up the ſhoulder-blade; The hinder-moſt branch is beſtowed upon the ſecond pair which heaveth up the breſt.

The fourth pair.

The fourth pair cometh out of

of the hole common to the third and fourth *vertebra*, and hath two branches: The foremost hath three twigs. The first is bestowed upon those which bend the neck. The second is bestowed upon the transverse muscle of the neck, and the *cucularis* of the shoulder blade. The third goeth to the sinewy part of the midriff. The hindermost branch goeth to the back-bone under the muscles of that part, upon which it bestowed twigs.

The fifth pair.

The fifth pair marcheth out between the fourth *vertebra*; and hath two branches. The foremost hath four sprigs; the first goeth to those that bend the neck; the second goeth to make *nervus phrenicus*: the third to the *deltoides*: the fourth goeth to the *deltoides*, and to the *Coracohyoideus*. The hindermost branch goeth to the *spina*, and is bestowed upon the muscles there.

The sixth pair.

The sixth pair cometh out under the sixth *vertebra*, and hath, as the rest, two branches: The fore-

foremoſt ſendeth firſt one ſprig to make *nervus phrenicus*: then it goeth to the arm: The ſecond branch goeth to the muſcles behind which ſtretch out the neck and head.

The ſeventh pair.

The ſeventh pair cometh out of the hole common to the ſixth and ſeventh *vertebra*. The foremoſt and largeſt branch is carried to the arm. The hindermoſt and ſmalleſt is beſtowed upon the muſcles of the neck, and quadrat muſcle which pulleth down the cheek.

CHAP. XV.

Of the nerves of the vertebræ of the Breſt.

The firſt pair.

FRom the marrow of the *vertebræ* of the breſt, twelve pairs do ſpring. In all of them, the foremoſt branch is biggeſt; but the hindermoſt, which is beſtowed upon the muſcles ſeated in the back, ſmalleſt.

The firſt, ſpringeth out of the hole

hole which is common to the seventh *vertebra* of the neck, and the first of the breſt. The foremoſt branch marcheth upwards towards the *ſternum*, and beſtoweth a twig of *muſculus ſubclavius*, and thoſe which ariſe from the *ſternum*; and that which from the hollowneſs of the ſhoulder-blade. The hindermoſt branch, lurking under the muſcles which cleave to the *vertebræ*, is beſtowed upon the muſcles of the neck, head and ſhoulder-blade.

The ſecond pair.

The ſecond iſſuing out of the place between the firſt and ſecond *vertebræ* of the breſt, paſſeth to the arms, and produceth the firſt intercoſtal nerve, from whence twigs paſs to the muſcles ſeated upon the breſt; both the foremoſt and hindermoſt branch have the ſame diſtribution.

The reſt of the parts.

The reſt of the ten pairs come out of the lateral holes of the *vertebræ*, and immediately are divided into two branches; whereof the foremoſt being larger,

ger, make up the intercostal nerves; and being joined with the intercostal veins and arteries, and received into the groop of the lower part of each rib. The hindermost march towards the back-bone, amongst the muscles which cleave to the *vertebræ*, and serve for the stretching out of the breast.

CHAP. XVI.

Of the sinews of the marrow of the vertebræ of the loins.

ALthough there be but four lateral holes in the *vertebræ* of the loins; yet there are five pairs of sinewes. The greater foremost go to the muscles of the belly. The hindermost go to those which rest upon the *vertebræ*. The foremost are tied together, the first with the second, the second with the third, the third with the fourth, and the fourth with the fifth. *The first pair.*

The first cometh out of the

lateral hole between the laſt *vertebra* of the breſt, and the firſt of the loins: the foremoſt branch is beſtowed upon the fleſhy part of the midriff and the muſcle *pſoa*. It ſendeth alſo a twig by the *arteria præparans* to the ſtones: the hindermoſt is beſtowed upon the *muſculus longiſſimus* and *ſacrolumbus*.

2. The ſecond cometh out between the firſt and ſecond *vertebra* of the loins. The foremoſt branch is beſtowed upon the *muſculus faſcialis* and the skin of the thigh. The hindermoſt is beſtowed upon the *muſculi glutæi*, and the membranous muſcle which ſtretcheth out the leg.

3. The third marcheth out between the ſecond and third *vertebra*. The foremoſt ſendeth one twig to the knee and skin thereof, and another which doth accompany the *ſaphena*. The hindermoſt turneth back, and is beſtowed upon the muſcles which reſt upon the loins.

4. The fourth being the largeſt of the

the muſcles of the loins marching under the *os pubis*, doth accompany the vein and artery, which paſs to the leg.

The fifth cometh out between the fourth and fifth *vertebra*, and is beſtowed upon the *obturatores muſculi*, and the muſcles of the prick. The hindermoſt is beſtowed upon the muſcles and skin which are above the *vertebra*.

CHAP. XVII.

Of the nerves which come from the marrow of os ſacrum.

FRom the marrow of the *os ſacrum* ſix paires of ſinews ſpring.

The firſt pair.

The firſt iſſueth out between the laſt *vertebra* of the loins, and the firſt of *os ſacrum*. The foremoſt branch of it is beſtowed upon the muſcles of the belly, and the ſecond which bendeth the thigh. The hindermoſt is beſtowed upon the skin of

the buttocks, and the greatest *glutæus*.

Of the other five pair.

The other five pairs on each side have two pairs, whereof the first three go to the legs. The second under these are bestowed upon the muscles of the bladder and fundament, to the neck of the matrix in women, and to the prick in men. The last are spent upon the muscles of *os ilium* and *sacrum* towards the back part, which are *longissimus*, *sacrolumbus*, *sacer*, and the *glutæi*.

CHAP. XVIII.

Sheweth how the brain is to be dissected.

THE brain is to be divided in three parts; to wit, the uppermost, the middlemost, and lowermost part.

In the uppermost, these parts are to be seen; the windings, *falx*, and *corpus callosum*.

In the middlemost under the *fornix*, behold the ventricles, the

the *plexus choroides*, and *cerebellum*.

In the lowermoſt you ſhall find the *infundibulum*, the glandules under it, *proceſſus mammillares*, eight pair of ſinews, and the roots of the *ſpinalis medulla*.

CHAP. XIX.

Of the outward parts of the eye.

WEE have ſpoken of that part which is decked with hair: Now we are to ſpeak of that part which is not altogether garniſhed with hair. In Latin it is called *facies*, in Engliſh, Face, becauſe it cauſeth every one to be diſcerned who he is. *Of the face.*

The parts of it are either common or proper: The common are *cuticula*, *cutis*, *adeps*: It hath no *membrana carnoſa*, for it endeth in the chin, and the fat is onely in the places between the muſcles. The parts proper are either containing or contained. The parts containing are the *The parts of it.* *The common.* *The proper.*

muſcles and bones, which are ſet down in their proper places. The parts contained are the inſtruments of the four Senſes, to wit, the eye, the ear, the noſe, and mouth. Firſt, then of the eye, partly becauſe without ſight the life is tedious; partly becauſe the object of it is moſt ſubtil. They are in number two; Firſt to look aſide. Secondly, to ſee by one if the other be loſt. Thirdly, to ſee more diſtinctly and clearly.

Why the eye is firſt to be handled.

Why two.

In figure they are round: firſt, becauſe this figure is moſt capable of the multitude and bigneſs of the objects, and fitteſt for quick motion. They are ſeated high, the better to eſſay, and govern motion which is foreward.

Their figure.

Their ſituation.

The parts of the eye are either external or internal. The external are in number four. Firſt, the eye-brow, the ſeat of diſdain and pride. It is framed of the skin, muſcles, fat, and hair. The skin is thick and hard to hinder the immoderate grow-

Its parts. The external. The eye-brow.

ing

ing of hair. It is oblique the better to turn away those things which might fall into the eye. Secondly, the eye-lid; in man the uppermost is biggest, and moveth; but in birds the lowermost is biggest, and moveth.

The motion of the eye-lids.

The hairs called *cilia* in the upper lid turn upwards, but in the lower downward, that they should not offend the eye and sight. They repel small bodies from entring into the eye.

The hairs of the eye-lids.

It is framed of the skin; the musculous flesh, and a grisly welt, which keepeth the *cilia* from growing. Thirdly, the corners, the greater is toward the nose, the lesser towards the temples. Fourthly, *caruncula lachrymalis*, the glandule in the greater corner, seated before the hole which passeth into the nose. In it are the holes by the which the tears issue. In it is seated the *fistula* of the eye.

The frame of the eye-lid.

The corners.

The glandule.

CHAP. XX.
Of the tunicles of the eye.

The use of the fat

THE inner parts are in number five; the first is the fat, which first defendeth the eye from cold: Secondly, keepeth it from the hardness of the bone: Thirdly, moisteneth the eye: Fourthly, filleth the distance between them. Secondly, the six muscles, which are set down in their proper place. Thirdly, the tunicles, whereof the first is called *conjunctiva* and *adnata*; because it cleaveth firmly to the eye, and keepeth it within the *orbita*, that it start not out in violent motions. It covereth the half of the eye orbicularly, but it springeth from the *pericranium*. The second is *cornea*, because it is like to the lantern horn in firmness and brightness; it may be severed into many skins. In the fore-part it is thinner and brighter; but in the hinder-part thicker and darker. It is thin that the *visibiles* spe-

The muscles. The tunicles.

species may the more readily be carried to the chryſtallin humour. It is ſmooth alſo: for if it were wrinkled, it would have hindered the ſight, it ſpringeth from the *dura mater*. The third is *uvea*, becauſe it is like the husk of the black grape, for in colour it is not unlike, and ſmooth without, and rough within. It is of ſundry colours, the better to apprehend colours. The inner ſide is black, that a weak light might the better be ſeen by the chryſtalline; for light in a dark place ſhineth the more brightly. It ſpringeth from the *pia mater*. In the middle it is perforate, which maketh the *pupilla*: this is nothing elſe but the hole of *uvea*. The circle about the *pupilla* may be ſeparated from the *uvea* in an Oxes eye boiled. Fourthly, *Chryſtallina*; it is a membrane thin and clear, compaſſing the chryſtalline humour thinner before than behind. Fifthly, *vitrea*; it is very thin, white, and ſmooth: If it be cut, the vitreous humour iſſueth out.

3.

The Pupilla.

4.

The cryſtallin.

CHAP. XXI.
Of the humours of the eye.

THE humours make up the fourth internal part. They are in number three; *aqueus, cristallinus, vitreus.* The first is the watrish humour, so called, because it runneth as water; it hath no tunicle, it not onely filleth the cavity between the *cornea* and the chrystallin humour; but compasseth also the vitreous humour; for if ye cut the eye behind, it will as well run out there as before. The watrish humour is kept together by some small thred-like substances. They are under the circle of the *uvea*, and by reason of them the cataract groweth. This texture of filaments is by some called *tunica ciliaris*, so called, because they are black and like to the eye-brows, but improperly. The second is the Crystallin humour, so called, because it resembles a Crystal or Ice; it is of a compact watrish substance.

1.

Where the cataract groweth.

2.

It is

It is plain before, that there might be a competent ſpace for receiving of the viſible reſemblances; for the which uſe a round figure was not fit; yet it is plain behind, where it ſticketh in the humour vitreous. It cauſeth every thing to ſeem bigger. It is placed not in the middle of the eye, but neer to the *papilla*. The third humour is the *vitreous* or glaſs-like humour; for it is like to molten glaſs. It is placed behind, that if any thing ſhould eſcape the Cryſtalline humour, it might be ſtayed there, and not return to the *uvea*. It receiveth the Cryſtallin humours as a ſoft pillow, wherefore it is ſofter then it. It is more copious then the other two; it is ſtayed by ſome filaments; theſe being by inciſion ſeparated, the glaſs-like humour runneth as water. The fifth internal part the veſſels make. The external veins proceed from the external jugulars; the internal from the *plexus coroides*. The external arteries ſpring from

3. *The fifth internal part.*

from the external ſoporals; but the internal from the *rete mirabile*. There be two nerves appointed for each eye, one for motion called *motorius*; the other for ſight called *viſorius*, this is ſofter.

CHAP. XXII.

Of the Auricula.

NOW followeth the inſtrument of hearing, the ear. The ears are two; that the one failing, yet we might hear with the other. They are placed in the head, becauſe ſounds aſcend, and becauſe we have always need of this.

The parts of it. Them parts of the are are either outward or inward. The outward is called *auricula*; of it ſome parts are common, ſome proper. The common are *cuticula cutis*, *membrana nervea*, *caro*, and fat in the lobe. The skin is thin; under it there is ſmall ſtore of fleſh, which is tied to the cartilage by a membrane. The lobe by reaſon of the fleſh and fat, ſeemeth

seemeth fleshy, and fatty. The proper parts of the *auricula* are the muscles, veins, arteries, sinews, and the cartilage. As concerning the muscles, they are set down in their proper treatise. The veins come from the external jugulars; the arteries from the soporals; the nerves from the second pair of the neck. The cartilage was fittest for this place. If a bone had been here, it had been troublesome, and easily broken: if flesh, it had been subject to contusion, and could not have repelled the sound. It is tied to *os petrosum* by a strong ligament which riseth from the *pericranium* to stay it up.

Its uses.

The uses of the outward ear are these: first, it serveth for beauty. Secondly, to help the receiving of the sounds the more readily; for first, it gathereth them being dispersed in the air. Secondly, it doth moderate them, that they come gently to the *tympanum*. The hair here hindereth the creeping of insects.

CHAP.

CHAP. XXIII.

Of the inward part of the ear.

THE inward ear is framed of four cavities, and their furniture. The first is *meatus auditorius*, which is alwayes open; it hath windings, lest the air should suddenly rush in upon the *tympanum*. It is oblique; to abate the vehemency of a sound. It marcheth upwards, that if any thing should go into it, it might the more readily fall out. It endeth at the *tympanum*, and containeth the ear-wax, by the which the brain is purged, and insects hindred from creeping in, entangling them as bird-lime. It endeth at the *tympanum*.

The drum.

This membrane is very dry, that it might give the better sound. It is thin and clear, that the sounds may be the more readily sent to the internal air. It is strong that it should the better endure external harm. It hath a cord for strength and stretching of

of it, even as the Military Drum hath. The second cavity by *Vesalius* is called *pelvis*, the tunnel, by *Fallopius conchia*, the perwinkle, from its figure.

Pelvis.

The furniture of this cavity serves for three purposes, for motion, for transmission of sounds, and for the expurgation of the excrements; for motion, the three little bones, the ligament and muscles do serve. The little bones are in number three; the first is *malleolus*, the little hammer. It hath a thick and long head, cleaving to a narrow and small neck. It hath a smooth cavity to be articulate with the anvil. It hath two processes springing from the neck; unto the upper, which is lesser and crooked, the corde of the Drum cleaveth. The membrane resteth upon the lower. The second is *Incus*, the anvil, having a head and two feet. The head is somewhat thick. In the top of it there is a smooth cavity which receiveth the knob of

The use of the things contained in it.

The three little bones.

1.

2.

of the hammer. The ſmalleſt and longeſt foot is tied to the top of the ſtirrop; but the thickeſt, broadeſt and ſhorteſt reſteth upon the *os ſquamoſum* of the temples. 3. The third is *ſtapes*, or the ſtirrop. In figure triangular, in the middle hollow, to give way to the paſſing of the air to the *labyrinthus*. In the upper part of it is a very ſmall and round knob, upon the which the longeſt foot of the anvel reſteth; the *baſis* is ſet to the oval hollowneſs, and the membrane ſhutteth it.

The qualities of theſe bones. Theſe bones have no *perioſtium*, for then they would be unfit to return any ſound. Secondly, they have neither cartilage nor marrow, for they muſt be hard. Thirdly, in infants they are as perfect and as big as in men. Fourthly, they are placed up by a ligament, that being ſhaken by the internal air, moved by the external, the ſharper ſound may be cauſed.

Its uſes. Theſe bones have theſe uſes; Firſt, they ſtrengthen the *tympanum*;

num; therefore the hammer with one of the feet of the anvil lean upon the Drum. Secondly, by shaking of the *tympanum*, they bring the better the sound to the auditory nerve. Thirdly, they further the receiving the diversity of sounds, as the teeth the distinction of words. Last of all, for motion the muscles are appointed: one is without the drum, above in *meatus auditorius*, whose tendon is inserted into the *tympanum*, against which the *malleolus* is inserted to draw it outward together with the hammer. The other is within the Drum in *os petrosum*, inserted by a double tendon in the hammer to draw it back.

The third cavity is called *labirynthus*, because it hath sundry windings. There are six semicircles in this cavity. The end of these windings is to mitigate the sound which was redoubled within the *conchia*, as an eccho. *The third cavity.*

The fourth cavity is called *cochlea*, or a wilk, so called from the figure; for it hath three, some- *The fourth cavity.*

of the hammer. The ſmalleſt and longeſt foot is tied to the top of the ſtirrop; but the thickeſt, broadeſt and ſhorteſt reſteth upon the *os ſquamoſum* of the temples. 3. The third is *ſtapes*, or the ſtirrop. In figure triangular, in the middle hollow, to give way to the paſſing of the air to the *labyrinthus*. In the upper part of it is a very ſmall and round knob, upon the which the longeſt foot of the anvel reſteth; the *baſis* is ſet to the oval hollowneſs, and the membrane ſhutteth it.

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The fourth cavity is called *cochlea*, or a wilk, so called from the figure; for it hath three, some- *The fourth cavity.*

sometimes four wreathings: within there is a chink, by the which the sound passeth to the brain, and the bilious excrement falleth into the aire.

How the hearing is caused.

The hearing is thus caused, The air passeth through the first cavity, and gently beateth upon the drum, which being shaken, tosseth the three bones joined to it. Then the kind of sound is impressed into the inward aire, which having the quality of the sound, and being circulate through the windings of the labyrinth to make it purer, is conveyed by the *cochlea*, and delivered to the auditory nerve that the animal spirit may present it to the common sense, the judge of all species.

CHAP. XII.
Of the Nose.

THE instrument of the third sence, smelling, ensueth, to wit, the nose: the parts of the

the nose are either external or internal. The external parts are these, the skin, the muscles, the veins, arteries, nerves, bones and cartilages. First, the skin cleaveth so fast to the muscles and cartilages that it cannot be severed without renting. Secondly, as for the muscles, they are set down in the discription of muscles. Thirdly, the veins come from the external jugulars, as the arteries from the soporal. Fourthly, the sinews come from the third pair, on each side one. Fifthly, the bones of the nose are set down in the doctrine of bones. Sixthly, the cartilages are in number five; the two upper make up the half of the *Ala*, the two under make up the other half; the fifth division the nostrils: the cartilages are onely moved by the muscles.

The external parts.

1.

2.

3.

4.

5.

6.

The inner parts of the nose, are these: First the membrane which covereth the inside of the nose, which proceedeth from the *dura mater*, and passeth through the holes

The inner parts.

holes of the *ethmoides* bone. Secondly, the musculous membrane, which draweth together the nostrils. Thirdly, the hairs which disperse the air, and hinder the creeping in of insects. Fourthly, the red fleshly spongious substance, with which the holes of the *ethmoides* are filled up; from this the *polypus* springeth. The length of a comely nose is the third part of the length of the face. The upper part of the nose which is bony, is called *dorsum nasi*, the ridge *spina*. The lateral parts, where the cartilages are, *alæ*, *pinnæ*; the tip of the nose *globulus*, *orbiculus*, *pynula*. The fleshy part next to the upper lip, *columna*.

The denomination of some parts.

Its uses.

The uses of the nose are these; First, by it the air is sent to the brain, for the generation of the animal spirits. Secondly, the lungs by it draw in air for the refreshing of the heart, and the generation of the vital spirits. Thirdly, smels by it are carried to *processus mammillares*. Fourthly, by

by it the brain dischargeth its excrements. Fifthly, it furthereth the speech. Sixthly, it beatifieth the face. Seventhly, it parteth the eyes, that the one should not see the other, which would have hindered the sight. Eightly, it is a defence to them also, and stayeth the visible resemblances. Ninthly, by fleering up, it expresseth anger, so that in the Hebrew tongue it signifieth anger.

CHAP. XXV.

Of the Lips.

NOW last of all followeth the mouth, wherein is contained the tongue the instrument of tasting. The use of it is fourfold; for it serveth for breathing, taking of food, speaking and discharging of the excrements of the brains, lungs, and stomack.

The external parts of the mouth.

The places of the mouth are either external or internal: The external are the lips: these are framed of a fungious substance, & the end of the muscles covered with

with the skin: They are in number two, the upper and lower. Of the muscles of the lips, sufficient is spoken in the proper place. The lips within are covered with a membrane common to the mouth and stomack: and from hence cometh the trembling of the lower lip before vomiting. The parts which touch one another are red, by reason of the afflux of blood. The colour of these are diligently to be observed in diseases.

The uses of the Lips.

The uses of the lips are these: First, they serve for the conveniency of eating and drinking. Secondly, for the beautifying of the face, if they be well fashioned. Thirdly, for the containing of the spittle in the mouth, that it should not run out at unseasonable times. Fourthly, to keep the gums and teeth from external injuries. Fifthly, for framing of the speech. Sixthly, for kissing.

CHAP.

CHAP. XXVII.

Of the inner parts of the Mouth.

THE inner parts of the mouth are theſe; The gums, the teeth, the *palatum*, or roof of the mouth, the almonds, the *uvula*, and tongue. The gums, 1.
they are fleſhy ſubſtances, deſtitute of motion, appointed for the keeping of the teeth in their ſockets. As for the teeth, look 2.
for them in the doctrine of bones. The roof of the mouth is vaulted, that the air being repercuſſed, the voice may be the ſharper. The skin there is wrinkled and rough, that the white 3.
hard membrane ſhould the more firmly cleave to the bone, and keep the meat together while it is a chewing. Of the almonds, 4, 5.
and *uvula* we have ſpoken in the diſcourſe of the neck. The laſt of the inner parts is the tongue: 6. *The tongue. Its parts.*
in figure it is pyramidal: it is compoſed of fleſh, muſcles, ligaments,

ments, and the skin that covereth it. The skin that covereth it is of an exquisite sense, and proceedeth from the *dura mater*. The flesh is spongious, and such as is not in any parts of the body, that it might receive the qualities of sapors, and judge of them the better. From hence it cometh, that it doth imbibe the fumes and vapors of the humours predominant in the body, which by its colour it doth declare.

Its motion. The tongue moveth forward, backward, to every side it is contracted, thrust out, and doubled. Look for the muscles appointed for these motions in their proper place.

Its division. Although it seem but one continual member, yet it is divided into two parts by a line going alongst it. And in the palsey of one side of the body, one half of the tongue may be affected, the other remaining sound. Of the ligaments, the lower which is called *frenum*, as in the prick, is most remarkable: By this part Nature sheweth that mo-

moderation is to be observed in the use of these members. If this ligament be extended to the top of the tongue, it hindereth sucking in children, so that they are said to be tongue-tied. The veins proceed from the external jugulars under the tongue, they are called *ranulares*, from their colour. The arteries come from the soporals. Sinews it hath from the third and seventh pair. The uses of the tongue, are these; First, it is the instrument of tasting: Secondly, it uttereth the speech: Thirdly, it helpeth the chewing of meat, by tossing of it to and fro, and turning it down to the stomack, Fourthly, it serveth for licking, from whence in Latin, it is called *lingua à linguendo* from licking.

The tongue-tying in children.

The vessels.

THE FOURTH BOOK,

A description of the Veins, Arteries, and Sinews of the Limbs.

CHAP. I.

Of the Veins of the Arms.

RAmus *ſubclavius*, or the branch of the *vena cava*, aſcending under the cannel-bone, when it is come to the arm-pit, it is called *axillaris*; and it parteth it ſelf in two veins, the *cephalica*, and *baſilica*.

The *cephalica* in beaſts doth wholly ſpring from the external jugular; but in man it receiveth only a ſpring from the external jugular. Wherefore in diſeaſes of

of the head it is not without cauſe opened. It paſſeth through the upper and outward parts of the arm, to the bending of the elbow, where it is divided into two branches; of the which one, joining with the branch of the *baſilica*, makes the *mediana*. Wherefore the ſlope branches, which uſually are opened about the bending of the elbow, are only branches of the *cephalica*, and *baſilica*, which meeting, make the *mediana*. The other branch of the *cephalica* marching according to the length of the *radius*, reaching to the hand, through which it is ſpred; but chiefly that part which is between the ring-finger and the little finger.

There the *ſalvatelle* is placed, which is to be opened in melancholy diſeaſes. The *baſilica* paſſeth through the inner and lower part of the arm, accompanied with the artery and nerves.

About its beginning it maketh the *thoracica*, which having three or four ſprigs, and paſſing

under *ſerratus major*, and the ſubſcapular muſcle, it is tied to the upper intercoſtal, and about the *ſpina dorſi* is inoſculate with the twigs of *vena ſine pari*. *Baſilica* about the bending of the elbow is divided into that which is called *ſubcutanea*, and that which is called *profunda*.

Profunda the deeper; is annexed to the artery about the bending of the elbow, not under. Then paſſing between the focils, it is carried to the hand by the outer part of the *ulna*.

The *ſubcutanea* or the ſhalloweſt branch neer to the bending of the arm being turned to the outer part of the *ulna*, by the length of it, it is carried to the hand.

The *Mediana* paſſeth to the ſide of the hand by the middle part of the *ulna*.

CHA

CHAP. II.

Of the arteries of it.

RAmus *ſubclavius* ſo called, as that of the *vena cava*, when it is come to the arm-pits; it is called *axillaris*. It accompanieth the *baſilica*: for there is no cephalical. Neer to the arm-holes, it yieldeth that artery, which is called *thoracica*, from thence being carried to the bending of the arm, it is parted into two branches, which paſs to the inner ſide of the hand; for the outſide of the hand hath neither muſcle nor artery.

The one of theſe reſting upon the *radius*, is that which is felt about the wriſt.

The other marching by the *ulna* is with its fellow, ſpred through the hand.

CHAP. III.

Of the ſinews of the Arm.

OUT of the perforations of the four lower *vertebræ* of the neck, and of the firſt two of the back ſix ſinews ſpring, which by the muſcle called *ſcalenus*, are carried under the cannel-bone to the arm-pit, where they are twiſted together; from theſe the four uppermoſt, accompanying the *baſilica* and the artery under the *diltodes* muſcle, are ſcattered through the inner ſide of the arm. The fifth and ſixth, turning up under the *rotundus major*, are inſerted into the hindermoſt muſcles of the ſhoulder-blade. Four remain, which paſſing along the arm are ſpred into the elbow and hand.

The firſt being carried under the inner ſide of the *biceps*, doth join it ſelf with the *cephalica*.

The ſecond being undivided and thicker, goeth down to the bending

bending of the elbow, being covered with fat, and there is under the artery and the *basilica*; but about the wrist it is above the vein. About the wrist it is divided into ten branches; imparting to every finger two sprigs, which pass along the sides.

The third being entire also, is carried all along the elbow by the wrist to the little finger: where divided into four twigs, it is bestowed upon the outside of the hand.

The fourth being thickest of all, is carried from the artery and veins by the backside of the arm to the *radius*; where being joined with the *Cephalica*, it endeth at the wrist.

CHAP. IV.

Of the veins of the Foot.

THE crural vein sendeth a branch to *musculus triceps*, called *Tescia*, and is divided into four branches: of the which

two are in the inside of the thigh, and so many in the outside. The one of the external ascendent to the fat of the thigh, the other passing according the length of *musculus suterius* to the ham; and from thence to the inner ankle, making the *saphena*. Of the inner branches the one lying high, is joined with the crural artery, and passing through the outside of the ham, is carried to the outer ankle: the other lying deeper, as it passeth, bestoweth twigs to the adjacent parts, and about the ham, maketh the *poplitea*; from thence being carried between the focils by the chin of the inner ankle, it is bestowed upon the soal of the foot, as the *saphena* was upon the outward parts. The vein hath valves within like to a half moon; without they are like knots; they are most commonly two together, one on each side, leaving some distance between, partly to strengthen the coats of the veins, partly to rule the motion of the blood.

The

The arteries have no valves in their progreſſion, that the vital ſpirit may ſpeedily as the beams of the Sun, paſs to the furthermoſt parts.

CHAP. V.

Of the arteries of the Foot.

Arteria cruralis, or the crural artery, a little below the groyn, doth ſend two branches through the muſcle *triceps* to the *gloutii*, or muſcles of the buttock. Afterward it ſendeth two to the fore of the thigh; then undivided, it paſſeth to the ham, where it is divided into two branches, whereof the one paſſeth by the ſide of the outward part of *tibia* above the muſcle *peroneus*, and is beſtowed upon the upper part of the foot; the other entering into the *ſolæus*, and paſſing to the *pterna*, is diſperſed through the ſoal of the foot. The *ſaphena* is not accompanied with an artery, and the nerve is not very

very neer unto it, so that it may be safely opened.

CHAP. VI.
Of the nerves of the Foot.

From the three lowermost *vertebræ* of the loins, two sinews spring in the forepart of the thigh, severed first, and then being united pass to the groyn. There it
3. is divided into five branches, compassed with a membrane, which dispersing themselves on every side into the muscles of the forepart of the thigh, even to the *rotula*, there being, cannot be discerned, unless the muscle *psoa* be rent; within the which they lye hid. Then besides these, you shall see another small nerve passing the oval cavity of *os pubis*, to be spent upon the *triceps*. Through the back-part of the thigh, a great and thick nerve passed framed of three, which spring out of the three upper holes of *os sacrum*, and being carried

caried by the ſinews of *os iſchium*, through the inner nerves and back muſcles of the thigh, to the ham, there it is parted into two branches.

The one goeth down by the belly of the *tibia* unto the *perone*, beſtowing twigs as it goeth, paſſing by the chin of the inner ankle to the ſoal of the foot, it is ſevered into as many branches as there are toes. The other branch marching upon the *perone*, is caried to the inſtep of the foot by the outer ankle. By reaſon of this great nerve, they who are troubled with the *ſciatica*, finde pain not onely about the joynt of the thigh, but in the leg alſo, and foot. About the beginning of this nerve, another iſſueth out of the third hole of *os ſacrum*, and beeing carried above the ridge of the *os ſacrum*, it brancheth it ſelf into the muſcles of the buttocks, and thoſe which bend the *tibia*.

CHAP.

CHAP. VII.

Of the nerves of the ſpinalis medulla.

IF you invert the brain, you ſhall perceive four roots of the *ſpinalis medulla*, two from *cerebrum*, and ſo many from *cerebellum*: theſe joined together make it up. It is of the like ſubſtance with the brain; but beſides the two membranes, wherewith the *cerebrum* is compaſſed, this hath a third ſtrong, and nervous proceeding either from *os occipitis*, where it is joined with the ſpondils, or from the ligaments of the *vertebræ*: this ſtrengtheneth the *ſpinalis medulla*, and keepeth it from tearing in violent motions. From the beginning to the end it groweth narrower and harder, ſo that when it is come to the end of *dorſum*, it endeth in ſmall threds like a horſe tail, that no danger ſhould be in that part where the whole *ſpina* is bended.

The nerves of the *ſpinalis medulla*,

dulla, are framed of sundry fi'aments twisted together, a d covered with a thin membrane; and as they come out of the holes of the back-bone, nature doth compass them with a thick and firm substance; which so firmly clip the *fibres* of the sinews that they cannot be severed. Besides the sinew cometh not out of that hole, directly opposite to its beginning, but out of the lower.

And when it hath passed through this hole, it doth not enter presently into the rib, which is next, but into the lower. Which when it hath touched, being divided, it turneth the lesser twig towards the *spina*, and the greater towards the fore-part. Out of this *spinalis medulla* twenty eight pairs of sinews spring, seven from the neck, twelve from the back, and five from the loins, and four from the *os sacrum*.

The first conjugation of the neck doth not spring from the sides of the *spina*, as the rest; but from the fore and hinderpart, and

and cometh out between the *occiput* and the first *vertebra*. The fore-branch is bestowed upon the muscles of the backside of the head, and the muscle of the *vertebra* of the neck.

The second Conjugation, by the hindermost branch turned up, ascendeth to the skin of the head, the ears, and the muscles; but by the foremost branch it is carried unto those muscles, which are common to the second spondil, and the *occiput*.

The third conjugation sendeth its foremost branch to those muscles which bend the neck; but the hindermost to the muscles which raise up the neck and head.

The fourth Conjugation sendeth its lesser and hindermost branch to the muscles of the neck; but the foremost and largest to the muscles which lift up the shoulder-blade and the arm.

The fifth conjugation with its lesser twig turneth to the hindermost muscles of the neck; and with

with the greater joineth it ſelf with the twigs of the fourth pair.

The ſixth pair by the leſſer and hindermoſt branch paſſeth to the hindermoſt muſcles: but with the foremoſt and biggeſt to the arm and the *diaphragma*.

The ſeventh with the greater branch paſſeth to the arm, but with the leſſer to the hindermoſt muſcles.

As for the nerves of the back, each of them hath two branches, one leſſer, which is ſent to the muſcles of the back; and one greater, which is beſtowed upon the intercoſtal muſcles.

One thing is to be noted that the ſinews which proceed from the *vertebræ* of the ſhort ribs are bigger then thoſe which are communicate to the upper intercoſtal muſcles. Thoſe about the middle of the rib are divided into two twigs; whereof the outermoſt is carried outward, but the innermoſt inwardly along the rib. Theſe nerves were to be biggeſt, becauſe they are diſtributed

ſtributed both to the muſcles of the belly, and to the parts contained in it.

As for the nerves of the loins, each pair of theſe hath anterior and poſterior branches, which are ſpent partly upon the muſcles of the loins, and *hypogaſtrium*; partly upon the legs. The *lumbares nervi*, or ſinews of the loins, meet, and are mingled with the *coſtales*. Whereby it cometh to paſs that the parts which are contained within the *peritonæum*, have their ſtrength from the *ſpinalis medulla*, as their ſenſe from the brain: for according to *Galen. cap.* 5. *lib.* 16. *de uſ. part.* the coſtal nerve is a ſprig of the ſixth conjugation.

As for the nerves of *os ſacrum* the firſt pair hath two branches, as thoſe of the loins; to wit, the anterior and poſterior; but the reſt of the pairs before they come out, are double on each ſide: and on each ſide one nerve marcheth for-

forward and another backward. The uppermoſt three, which are anterior go to the leg: The two lowermoſt paſs to the muſcles of the *anus* and bladder.

The

The explication of the third Figure.

1. *The musculous skin of the Head.* 2. *The muscles of the Arm.* 3. *The muscles of the Breast.* 4. *The muscles of the Belly.* 5. *The muscles of the thigh.* 6. *The muscles of the Legs.*

This figure is to be placed before the first Chapter of the Treatise of the Muscles.

Fig. III.

THE FIFTH BOOK

Containing a Treatiſe of all the Muſcles of the Body.

CHAP. I.

The deſcription of a Muſcle.

A Muſcle is a diſſimilary part, framed of its proper membrane, a fibrous fleſh, a tendon, veins, arteries, and nerves, appointed by nature to be the inſtruments of free motion. The parts then are either common or proper. The common are three: The vein, the artery, and the nerve. The proper ſo many; the fibrous fleſh, the membrane, and the tendon. The veins afford nouriſhment,

The deſcription of a muſcle.

The parts conſtitutive.

Veins. Arteries. Nerves.

riſhment, the arteries life, and the nerves motion. Theſe ſpring either from the brain, or from the *ſpinalis medulla*. It is implanted either in the beginning, or about the middle of the muſcle. The nerve as ſoon as it hath entered into the ſubſtance of the muſcles, like unto a ſhrub, it is diſperſed into a number of twigs, which at the laſt end in it, and become inconſpicuous. The fibrous fleſh is extended onely according to the ſtraight poſition of the *fibræ*, whereas the fleſh of the other parts have no certain poſition. The fibres of every muſcle are alwaies ſtraight: wherefore the muſcles of the belly have not their denomination from their fibres, for they are all ſtraight; but from poſition and ſituation: ſo that the muſcle called *maſſeter* is accounted double, ſeeing it hath two ſorts of fibres, one lying upon another. Every muſcle hath a proper membrane; It is ſo, more properly named then

The fleſh.

The fibres.

The fibres ſpring from the nerves according to Galen.

then a coat: for veins and arteries are properly said to have coats. The membrane doth either spring from the tendon, or is framed by nature in the very first conformation of the parts. The last proper part of the muscle is the tendon. It is a similary body, framed of the seed of a sinewy-like substance, onely (for it hath a peculiar substance differing from a sinew) white with a kind of brightness, thick, hard, and smooth, extended according to the length of the muscle. It is ten times bigger then a nerve: It beginning at the head of the muscle, passeth through the belly of it, and endeth in the tail, as manifestly appeareth in the foot of a Cock. All muscles which are apppointed for the moving of bones, have tendons; but those which move other parts, as the tongue, lips, bladder; and the *Anus*, seldome have. It is said to spring from the bone; this is to be understood by reason of its insertion, but not production. It is

The Membrane.

The tendon.

Which muscles have tendons.

How it springs from the bone.

It is the principal part of a muſcle.

It is the principal part of the muſcle, and not the fibrous fleſh: firſt, becauſe it onely hath ſtrength to lift up the bones: ſecondly, becauſe it onely is fit to contract it ſelf, whereas the looſe and ſoft fleſh is neither able to lift up the bones, nor to contract it ſelf: thirdly, becauſe there is not ſuch a part in all the reſt of the body. It hath its motory faculty from the nerve by influence, as the load-ſtone draweth the iron, and the cramp-fiſh doth benumme the hand of the fiſherman by the pole. It is framed by nature of the ſeed in the firſt conformation, and not of the nerve and ligament mingled together: Firſt, becauſe a nerve being ſomewhat ſoft, wil not admit commixtion with the ligaments being hard. Secondly, becauſe the nerve is not carried to the tendon, but doth end into inconſpicuous threed. Thirdly, ligaments are inſenſible, but tendons are of exquiſite ſenſe; as appeareth by the great pain wch enſueth

From whence it hath its motive faculty.

Its material cauſe.

enſueth if they be pricked. Fourthly, becauſe the ligaments of the bones have the compoſition of membranes: for they are made of ſtraight and tranſverſe fibres, as a web; whereas the tendons have onely ſtraight fibres. The tendon beginneth at the belly of the muſcles, for there it is bigger and ſtronger than in the head or tail. The tendons are ſometimes round, as in the *muſculus biceps*; ſometimes membranous, as in the muſcles of the belly. Theſe are the parts conſtitutive of a muſcle. It hath beſides theſe, parts derived from the poſition; and thoſe are three: The head, the belly, and the tail. The head is the beginning, this is in the part unto the which the muſcle is contracted: the belly is the thickeſt part, the tail is the ending of it, and is inſerted into the part which is removed. It is called ἀπόφυσις, and commonly *Tendo*. The ſubſtance of the tendon in all theſe parts is uniform. The uſe of a muſcle was ſet down in the

Its beginning.

The figure of tendons.

The parts from the poſition.

The uſe of a muſcle.

the last part of the description, in that it was said to be the instrument of free motion, and not voluntary, because beasts have muscles, unto whom Will is denyed, because it presupposeth Reason. A muscle in motion performeth that which a leaver doth, when as such a heavy weight is to be lifted up, which cannot be done with the hands onely. Seeing in every organical part there are four kinds of parts (according to *Galen.* 1. *de us. part. c.* 8.) The tendon is the principal part, which is sometimes altogether united, sometimes divided. The nerve is that part without the which the motion cannot be performed. The flesh bettereth the action. The rest of the parts help and further it.

The divers parts of a muscle.

BIBLIOTHECA BODLEIANA

CHAP.

CHAP. II.

Of the differences and actions of the Muſcles.

THE differences of muſcles are taken from ſundry things: Firſt, from their ſubſtance: ſo ſome are fleſhy, as ſundry of the tongue and *larynx*: ſome are membranous, as the *conſtrictores* of the noſe: and ſome are partly fleſhy, and partly nervous, as the temporall. Secondly, from the quantity. The greateſt of all is the firſt of thoſe wch extend the breſt for it doth aſcend from the end of *os ſacrum* to the firſt *vertebra* of the *thorax*. The leaſt of all is the internal muſcle of the ear; the reſt are of a mean bigneſs, & come near either to the biggeſt or the leaſt. From the quantity, the muſcles, are called either long, broad, or thick. Thirdly from the ſituation: from hence ſome are called external ſome internal, ſome oblique, ſome ſtrait, ſome tranſverſe:

Fourthly, from the figure: as *deltoides*. Fifthly, from their beginning: so some proceed from bones, some from cartillages, as those of the *larynx*; some from tendons, as the *lumbricales*. Sixthly, from the variety of parts; so some are called *bicipites*, having two heads. Seventhly, from their composition; so some are single, some double; because some have more heads, some more tailes. The unity of the membrane and belly, which wrappeth the muscle, causeth the unity of it; and the plurality of the membranes and bellies, the plurality of the muscles. Eightly, from their action: Four differences of the muscles are taken from hence: for first, some are hence called *fraterni*, or *congeneres*, brotherly; some *antagonistæ*, adversaries. Secondly, some onely move themselves, as the sphinters; some other parts, as the rest. Thirdly, some have one onely action, as the greatest part of the muscles; some have divers actions, as the

The causes of the unity and plurality of muscles.

masseter

maſſeter and *trapeſius*. The fourth difference is taken from the variety of the action; ſo ſome are called *flexores*, ſome *extenſores*, ſome *rotatores*, ſome *ſupinatores*.

The proper action of a muſcle.

As for the proper action of the muſcle, it is nothing elſe but the contraction of it towards its beginning. Now two things enſue after this contraction; for firſt the part into which the muſcle is inſerted, muſt be apt to move: ſecondly it muſt be drawn towards the beginning of the muſcle. The diverſity of the action proceedeth from the diverſity of the ſituation of the muſcles: ſo a ſtraight muſcle hath a ſtraight motion; a tranſverſe a tranſverſe motion, an oblique an oblique motion, and that which compaſſeth a part hath an orbicular motion as the ſphinter. Now of the motion of the muſcles there are four differences; firſt, the contraction: ſecondly, the perſeverance of the contraction: thirdly the relaxation of the contraction: and fourthly, the perſeverance of the

The cauſe of diverſity of the action.

The difference of the motion of muſcles.

Motus tonicus.

relaxation. This perseverance is called *motus tonicus*, when as the member is still kept in the same posture which is performed by that faculty which governeth the body. The efficient cause then of the action is the soul, moved by its appetite. It useth three instruments, the brain, the nerve, the muscle: the brain receiveth the charge, the nerve carrieth it to the muscle, and the muscle doth perform the action; so that a muscle from the action may thus be described: A muscle is an organical part of the body, appointed for the free contraction of it self towards the beginning, for the moving of the part into the which it is inserted.

The efficient cause of the motion.

A description of a muscle from its action.

CHAP. III.

Of the muscles of the Eye-lids.

EAch eye-lid hath four muscles the first is *frontalis*, to lift it up; the second is *orbicularis major*, or the largest round muscle under

under the frontall: the other two are called *Ciliares*, or of the eye-lids, in each of them there is one to shut the eye-lids, the motion of the upper is manifest, but of the lower obscure. In breadth they exceed not the breadth of the cartilage. To shew the frontall you must divide the skin of the forehead where the hair beginneth, untill you come to the eyebrow. *Orbicularis major* lieth under the frontall and appeareth when the skin of the eye-brow is removed. The *Ciliares* compass the eye-lids orbicularly.

The occipital, or nowl-muscles meet with the frontalls, or those of the fore-head in the upper part. The occipitalls begin on each side of the nowl, and marching upwards by a broad and membranous tendon to the ears, meet with the frontalls. If these be very fleshy, they are able to draw back the whole skin of the head.

CHAP. IV.

Of the muſcles of the Eye.

The ſtraight muſcles.

THeſe are in number ſix; four ſtraight, and two oblique. The firſt of the ſtraight is called *attollens*, or *ſuperbus*; that which pulleth up the eye. The ſecond is *deprimens*, or *humilis*, that which draweth down the eye. The third is *adducens*, or *bibitorius*, that which pulleth the eye to the noſe. The fourth is called *abducens*, or *indignatorius*, that which pulleth it from the noſe.

The beginning and inſertion of them.

All theſe ſpring from the cavity of the bone, making the orbit of the eye about the hole of the optick nerve; and being compaſſed with much fat, paſſing under the *conjunctiva*, end by a broad, but thin *aponeuroſis* in the *cornea*, or horney membrane, where it beginneth to be cleer.

The oblique muſcles.

The oblique muſcles are called *circumagentes*, winders about, and *amatorii*, or love-makers, and are in number two; the firſt is *obliquus major*,

major, seu superior, the uppermost and largest. This beginneth within the orbit of the eye, by the hole of the optick nerve, and passing to the upper part of the great corner of the eye, endeth in a small tendon, which passeth through a transvers cartilage there placed, as a cord through a pully, and is inserted into the upper side of the *cornea*. The second is *obliquus minor*, or inferior, the lowermost and smallest. This springeth from the lower, and almost outer part of the orbit, about the chink, which doth unite the bones of the upper jaw-bone, near to the glandule, and passeth obliquely to the outer corner of the eye, and in the upper meeteth with the tendon of the other oblique muscle. This bringeth the apple of the eye to the nose, as the other draweth it from it.

How the muscles are to be shewed.

Before you shew the muscles of the eye, cut off the fat with the sissars; then shew first the *obliquus major*, then the *obliquus minor*,

minor, and laſt of all the four ſtrait muſcles. Nevertheleſs, let the *oliquus major* remain laſt; when all the reſt are taken away, that you may ſhew the tendon of it paſſeth through the pulley the more plainly.

CHAP. V.

Of the muſcles of the Noſe.

The raiſing up muſcles.

THE noſe hath ſix muſcles whereof there be *erectores*, or raiſers upwards, two; one on each ſide of the noſe. They begin where the hole is under the glandule; and ſo cleaving to the bone are outwardly inſerted and carried to the *Pinna*, or ſides of the noſe.

The ſtretching muſcles.

There are two alſo called *dilatatores*, or openers on each ſide one, which dilate the noſtrils, not raiſing up the noſe. They are like to a leaf of the myrtle tree. They have their beginning from the bone of the upper jaw near to the ſides of the noſe, and being placed

placed about the cartilage, end in the top of the nose called *pirula*, the tip.

There are also two *constrictores*, pullers together of the nostrils. These are smal and membranous, hid under the membrane which covereth the inside of the nose. They have their beginning where the bone of the nose endeth, and are implanted in the inner side.

The pullers together.

CHAP. VI.

Of the muscles of the lips.

THE muscles of the lips are either common to the cheeks and lips, or proper only to the lips. The common are two: the first is *zygomaticus*, or *detrahens quadratus*: this is a thin muscle, resembling a membrane enterlaced with fleshy fibres. This hath its beginning from the *vertebræ* of the neck in the outer side, the shoulder-blade, the cannel bone and the brest-bone, and mounting up by oblique fibres to the face, is implanted in the chin where the two lips are joyned:

The common muscles. 1.

this muſcle doth draw the cheeks downward. The ſecond is called *buccinator*, or *bucco*; this lieth under the former, in the upper part of it. It doth make up all that part of the cheek which is blown up when a trumpe is ſounded. This ſpringing from the brims of the upper jaw-bone circularly, doth end in the brims of the lower jaw-bone. It is wholly membranous, and interlaced with divers *fibres*, & is ſo covered with the membrane wch covereth inwardly the mouth, that it hardly can be ſevered from it. When this muſcle is contracted, it is turned inward, and ſo it turneth in the meat which hath eſcaped the teeth; and ſo when the meat is chewed, it is kept inwardly by the tongue, and outwardly by this muſcle, that it eſcape not from the teeth.

The proper muſcles. 1.

Now the muſcles proper to the lips, are four pair: Firſt, *par attollens*, which beareth up the upper lip. This ſpringeth from the firſt bone of the upper jaw: where the apple of the cheek is, there it

it is broad and fleshy: from thence marching obliquely to the fore-part, it is inserted into both the sides of the lips near to the nose. The second is *deprimens*, which pulleth down the lower lip. It springeth from the sides of the chin, where two small bunchings are; there it is fleshy; from thence marching obliquely, it is inserted into the middle of the lip: it is every where broad. The third pair is *abducens*, or drawing the lips to the sides. It ariseth fleshy and round from the hollowness which is under the *maxilla*, and being lapped with much fat, it is inserted into those places, where both the lips are joyned together. The fourth is *corrugans*, or *constringens*, that pair which purseth the lips together. It is called also *osculatorium*, or the kissing pair, which draweth the lips together when we kiss. This pair is framed of a fungious fleshy substance, having orbicular fibres as the *sphincter* hath. The ends of both the lips

3.

3.

4.

are

are made up of these, which appear red if we be in health, but pale if it be sickly.

CHAP. VII.

Of the muscles of the lower jaw.

THE lower jaw is moved upwards, downwards, towards the right side, towards the left side, and towards the back-part. To procure these motions five pairs of muscles are appointed:

1. The first is called the *temporale*. This doth spring from all the hollowness of the bones of the Temples, by a broad, fleshy, and semicircular beginning, and by degrees becoming narrower; and being carried under the yoke-bone, it is inserted into the progress of the lower jaw-bone by a strong tendon. This tendon is dispersed through the whole muscle. The *fibræ* pass from the centre to the circumference. This muscle is covered in its upper part with the *pericranium* but in the lower part it is bare, and resteth

reſteth upon the bare *cranium*. Wherefore if this muſcle be wounded, fearfull ſymptomes enſue, partly becauſe the tendon paſſeth through the whole muſcle: partly becauſe it is covered with the *pericranium*. This muſcle forcibly pulleth up the lower jaw, and ſo ſhutteth the mouth, and ſpringeth from *os frontis*, *os ſyncipitis*, *temporum* and the *ſphænoides*. The ſecond pair is called *deprimens digaſtricum*, or *biventre*, becauſe it hath two bellies, between which a tendon lieth: this doth pull down the jaw, and ſo openeth the mouth. It hath its beginning from the proceſſes of the veins of the temple, called *Styloidei*, where it is nervous and broad; and afterward becoming fleſhy, ſmal, and round, it paſſeth downward, and is inſerted into the inner fore-part of the jawbone, which is under the chin, and ſomewhat rough. The third is called *maſſeter*, becauſe it ſerveth for chewing by moving the jaw to the right and

Why the wounds of the temporall muſcle are dangerous.

and the left side: from its situation it may be called *lateralis*. This hath two beginnings: one is nervous springing from the suture where the first bone of the jaw is joyned to the fourth. This beginning is large and strong: the other beginning is fleshy, proceeding from the *os jugulare*, and so marcheth towards the chin, and is implanted into the whole largeness of the lower jaw strongly. The fibres of this muscle by reason of the two beginnings cross one another; so that these muscles do not only move the jaw laterally, but backward and forward also.

Its beginning.

1.

2.

4. The fourth pair is called *pterigoidium externum*, *aliforme externum*, or *pterigoidium adducens*. This being in its beginning strong, and partly nervous and partly fleshly, doth spring partly from the upper externall sides of the wing-like process, partly from the rough and sharp line of *os cuneiforme*: then marching by straight fibres, it becommeth greater

greater. It is inserted by strong tendons into the internal laternal part of the jaw which is under the tendon of the temporal muscle. This moveth the jaw forward, which appeareth when the lower teeth are placed above the upper. The fifth pair is termed *maxillum adducens*, or *pterigoideum internum*. This draweth the jaw towards the head, or backward. This, in the beginning being thick and nervous, doth spring from the inner cavity of the wing-like process, then becometh fleshy, large and thick; marching by a straight passage it is inserted into the lower jaw by a nervous, broad and strong tendon, in the inner and hinder part of the jaw, about the cavity where the nerve entereth where some aspirites are found. 5.

CHAP.

CHAP. VIII.

Of the muſcles of the Ear.

THe ear is moved, though obſcurely; four manner of ways: *viz.* upwards, downwards, forward, and backward. The muſcles which move the ear are either upward or inward. In the out ſide there are four pair. The firſt pair is called *attollens*: this is nothing but a portion of the frontal muſcle, which is carried above the temporall muſcle, and is inſerted into the upper part of the ear: It is thin and membranous in the beginning, about the ending of the frontall muſcle, and becoming narrower, it goeth down to be inſerted into the upper part of the ear. The ſecond is *deprimens*, or puller down: This ſpringing from the *muſculus cutaneus* above the *parotides*, broad, fleſhy, and ſometimes fibrous, and afterwards becoming narrower, is inſerted by its tendon into

The outer muſcles, four pair.

into the root of the cartilage of the ear. The third is *abducens ad interiora*, whereby the ear is drawn forward: This is but a particle of the *musculus quadratus*, which pulleth down the cheeks. This ascending with its fibres, is implanted into the root of the ear. The fourth is *abducens ad posteriora*: this hath its beginning in the back-parts of the head, from the tunicles of the muscles of the nowl, above the *processus mammillares*: being there but narrow, it is carried downward transversly, and is inserted into the ear behind. In the inner part of the ear there are two, found out by *Aquapendente*, and *Julius Cesserius*. The first is called *externus*: it is small, springing from the skin and membrane which cover the passage of the ear; then becoming fleshy, it marcheth by a short tendon to the outer part of the *Tympanum*, & is inserted about the centre of it, where within the *malleus* or hammer is tied to it. The second is called *internus*: this is smal & placed

The inward muscles two.

ced within the *os petrosum*. It hath its beginning in the *basis* of the wedge-bone, then becoming somewhat fleshy, and after the midst of it narrower, it is divided into two small tendons, whereof the one is inserted into the upper process of the *malleus*, and the other into the neck of it.

CHAP. IX.

Of the muscle of the Tongue.

THE tongue hath four pairs of muscles by the which it is moved, according to all the differences moving by a wonderful volubility. The first is, *geneogloſſus*: this pulleth the tongue without the teeth and lips. It springeth from the ruggedness which is seen in the middle of the lower jaw in the lower part of it, and is inserted into the root of the tongue. The second is *Miloglossus*; this helps the former. This springeth from the inner part of the

the lower jaw; where the farthest grinding teeth are; and about the root of the tongue it is inserted into the ligament by the which the tongue is tied to the throat. The third is called *Hipsieg lossum*, or *retrahens*. This rising from the middle and upper part of the bone of the tongue fleshy, marching alongst the tongue, it is inserted into the middle of it. This draweth the tongue inward when it is contracted. The fourth is called *ceratogloſſum*, or *Styloglossum*: by this it is drawn towards the sides. It ariseth from the *styloides processus* of the bone of the tongue, by a fleshy small and sharp point; then becoming broader, it is inserted into the sides of the tongue.

CHAP. X.

Of the muscles of the bone of the tongue.

THis bone is moved upwards, downwards, forward, backward,

ward, and toward the sides, as the tongue is; because it is the foundation of the tongue, and the muscles of it serve for the motions of the tongue, and of the *larynx* also, when as the *larynx* and tongue are lifted and let down when we swallow. To perform the former actions it hath four pair of muscles. The first is called *Sternohoidæum*: this springing from the upper, but the inner part of the *sternum*, and marching by the wind-pipe is inserted into the root of the *hyoides*. The second is opposite to this, and is called *genehyoideum*: this springing from the inner part of the chin, fleshy, broad and short, is inserted into the root of the boue, where a cavity is to receive it. The third is *Thoracohyoideum*: It riseth at the first small and long, but fleshy about the neck and the Crowsbill-like process of the *scapula*; and passing under the *levator* of the shoulder-blade called *musculus patientiæ*, it is inserted into the point of the *hyoides*

oidei: it hath two bellies, and is very long. The fourth is *ſtyloceratohyoidæum*: This riſeth from the root of the *proceſſus ſtyloides* & endeth in the points of the *hyoides*.

CHAP. XI.

Of the muſcle of the larynx.

THE muſcles of the *larynx* are either common or proper. The *common* are four; two called *bronchii*, and as many called *hyothyroides*. The *Hyothyroides* doth liſt up the *larynx*. This ſpringeth from the whole *baſis*, almoſt of the bone of the tongue, and is implanted into the externall middle part of the *thyroides*, or bucklerlike cartilage. *Bronchius* pulleth down the *larynx*: This ſpringing from the inner part of the *ſternum*, mounteth up to the *baſis* of the *thyroides*, by the pipes of the *trachea arteria*. This muſcle with its fellow raiſeth up the length of the wind-pipe in beaſts and

The common muſcles.

The proper muſcles.

and fowls, which have a long neck. The proper muſcles are in number five. The firſt, is *Cricothyroides anticus*: this dilateth it. This ſpringeth from the fore and external part of the ring-like cartilage, and is inſerted into the lateral part of the *Thyroides*. The ſecond is *Cricothyroides lateralis*. It purſeth together the *thyroides*: It ſpringeth from the lateral parts of the *cricoides*, and is inſerted into the external lateral parts of the *thyroides*. The third is *Cricoaritenoides poſticus*: this openeth the warlike cartilage. This paſſeth from the back part of the *cricoides* to the *aritenoides*. The fourth is *Thyroarytenoides*, or *glottidæus*: this helpeth the former, and ſpringing from the inner and fore-part of the *thyroides*, is inſerted into the lateral parts of *artenoides*. The fifth is *Artenoides*: this is a round muſcle, compaſſing the war-like cartilage.

CHAP.

CHAP. XII.

Of the muſcles of the Uvula *and throat.*

THE *Uvula* hath two muſcles to hold it up: for it is pulled down by the weight of the meat as it paſſeth by it. The firſt is *Pteryſtaphilinus externus:* this ſpringeth from the upper jaw, a little below the furthermoſt grinder, and is inſerted into the ſide of the *Uvula.* The ſecond is *Pteriſtaphilinus internus*: this proceedeth from the lower part of the internal wing of the *pterigoides* proceſſes, and is inſerted into the *Uvula* in like manner.

The throat or the beginning of the *œſophagus*, called *pharynx*, hath ſeven muſcles, to wit, three pairs, and one without a pair. Of the pairs, the firſt is *ſphenopharingæus*: this ſpringeth from the ſharp point of the *ſpenoides*, near the *ſtyloides* proceſſes, and paſſing downward, is inſerted into

into the laterall parts of the throat, to pull up the mouth of the ſtomack. The ſecond is *Cephalopharingeus*. It ſpringeth from that part where the head is joyned to the neck, and marching down it is ſpread about the *pharynx*, and ſeemeth to make the membrane of it. The third *ſtylopharingeus*: This ſpringing from the *ſtyloides* proceſs, is laterally inſerted into the *pharynx* to dilate it. That which hath no march is called *œſophagus*: this ſpringing from one ſide of the *thyroides* and circularly compaſſing the hinder part of the *pharynx*, it is tyed to both the ſides of the *thyroides*, to contract the mouth of the ſtomack, as the *ſpincter* doth the *anes*.

CHAP. XIII.

Of the muſcles of the head.

THE muſcles of the head are either common or proper.

The

The common are those which together with the neck move the head: these are the muscles which move the neck. *The proper* are these which onely move the head when the neck remaineth immoveable: these are in number fourteen, or seven pair. First, two *mastoidæi* bend the head forward. These beginning in the upper part of the *sternum*, and the middle of the cannel-bone, are inserted into the process, called *mastoides*, obliquely. These are placed in the forepart; behind twelve or six pair are placed. The first is *splenicus*, or *triangularis*: this proceeding from the sixth *vertebra* of the breast, and marching to the third *vertebra* of the neck, is inserted into the *occiput*. The second, *Complexus*, or *trigeminus*. This springing from the transverse processes of the same *vertebra*, is inserted into the *occiput*. The third, *recti majores*, two: these springing from the edge of the second spondil, are inserted into the *occiput*. The

The common.

The proper.

fourth, *recti minores*, two: these lye under the former, proceeding from the back-part of the first spondill, end into the *occiput*. The fifth *obliqui majores*: these springing from the *spina* of the second *vertebra*, reach to the transverse processe of the first *vertebra*. The sixth, *obliqui minores*, under; these proceeding from the same beginning, are carried to the *occiput*. The oblique muscles turn about the head: the other muscles extend it.

CHAP. XIV.

Of the muscles of the neck.

THE neck hath eight muscles, four on each side: for it is extended by two pair; *semispinatum*, and *transversarium*. *Semispinatum*: this proceeding from the *spina* of the upper seven *vertebræ* of the breast, and five of the *vertebræ* of the neck, is inserted into the edge of the second *vertebra* of the neck. *Transversarium*: this rising

ising from the transverse processes of the sixth upper *vertebræ* of the back, is inserted outwardly into all the processes of the *vertebræ* of the neck. It is ended by four muscles, two on each side; to wit, first, *longus*: this being placed under the *œsophagus*, doth spring from the third *vertebra* of the back, and mounting up it is tied to all the *vertebræ*, and endeth in the fore-process of the first *vertebra*. The third *par spinatum, triangulare, scalenum*. It proceeding from the first rib, is inserted into all the transverse fibres of the neck, by oblique fibres internally. It is perforate to make way for the veins, arteries, and nerves which pass to the arms.

CHAP. XV.

Of the muscles of the Breast.

First of all these dilate it. The first is *Subclavius*: this ariseth fleshy from the inner part of the

The dilaters. 1.

cl avicula. and is inſerted into the
firſt rib, near to the *ſternum.* The
2. ſecond is *ſerratus major:* this doth
ariſe from the inſide of the ſhoul-
derblade, and the two upp.r ribs,
annd is inſerted into the lower
five true ribs, and two upper ſhort
3. ribs: The third is *ſerratus poſticus*
ſuperior: this lying under the *rhom-*
boides, ſpringeth from the edges of
the three lower *vertebræ* of the
neck, and from the edge of the
firſt *vertebra* of the back nervous,
and is inſerted into the three
4. upper ribs. The fourth, is *ſerratus*
poſticus inferior: this ariſeth from
the edges of the three lower *ver-*
tebræ of the back, and of the firſt
vortebra of the loins, and is inſer-
ted into three or four lower ſhort
5. ribs. fifthly, *The eleven externall*
intercoſtals, which perform the
office but of one muſcle. Theſe
ſpring from the lower part of the
upper rib, and are inſerted into
the upper part of the lower rib
obliquely, and forward

The con- Theſe that follow contract the
t afters. breaſt. Firſt, the *triangularis:* this
1. ariſing

arising from the inward & lower part of the *sternum*, is inserted into the cartilages of the two upper ribs. This as a pillow receiveth the upper part of the heart. The second is *sacrolumbus*: this arising from the *os sacrum*, and the sharp processes of the *vertebræ* of the loins, endeth in the upper ribs, about their beginnings, bestowing upon each rib a tendonous latch. Thirdly *the eleventh internal intercostals*, which are as one muscle. These pass obliquely from the lower to the upper rib, filling the distance: their fibres are opposite to those of the external, representing a Saint *Andrews* Cross. These serve for violent breathing, being seconded by the oblique muscles of the belly. 2. 3

Diaphragma, or *septum transversum*, is the instrument of free motion. The head of it is in the centre, but the tail in the circumference of the lower short ribs. For from the fourth short rib to the last, cleaving to the brims of them, it passeth to the double or

triple fleshy and tendonous productions to the twelfth *vertebra* of the back, and from thence to the third *vertebra* of the loins.

CHAP. VI.

Of the muscles of the loins.

THE back doth not move for want of muscles, and by reason of the ribs betweeu the neck and loyns whilst the outward parts are moved. Onely the last spondil of the back is moveable; for it doth not receeive, for it is received both above and under: but seeing it is annexed to the loins, the motion is rather to be ascribed to the loins than to the back. *The loins* are bended by two muscles called *flexores*; there is one on each side. They spring from the hinder part of the edge or brim of the flanck-bone, & inner laterall part of the *os sacrum*, and march by the transverse processes of the *vertebræ* of the loins, fleshy to the last rib.

Benders two

They

They are extended by four muſcles whereof there are two on each ſide. Theſe are ſo wrapped together according to the length of the *ſpina*, that they may ſeem either to be as many pairs of muſcles as are ſpondils, or one onely pair giving tendons to the *vertebræ*. The firſt is *ſemiſpinatus*; this ſpringeth by a nervous beginning from all the *ſpinæ* of the *vertebræ* of the loins, and *os ſacrum*, and ends in the tranſverſe proceſſes of the *vertebræ* of the loins, and all thoſe of the breaſt. The ſecond is *ſacer*: this ariſeth by a ſharp and fleſhy beginning from the hinder part of *os ſacrum*, and is inſerted into the roots of the *ſpinæ* of the ſpondils of the back. If theſe four muſcles conſpire together, they keep the *ſpina* immoveable: but if thoſe of the one ſide do onely move, it is drawn to one ſide. *Extenders four.*

CHAP. XVII.

Of the muſcles of the Abdomen.

IT hath ten muſcles; five on each ſide. The firſt is *obliquus deſcendens:* this being parted into ſeven or eight fleſhy portions, whereof the three greateſt are finger-like inſerted into *ſerratus major*, it ſpringeth from the lower ſide of the ſixth, ſeventh, eighth, and ninth lower true ribs: then going down obliquely, it cleaveth to the bended part of the outſide of the *os illium*, and to the edge of *os pubis*; then it endeth by a broad tendon in the *linea alba*. Wherefore it hath its beginning both above and below, but ending in *linea alba*. The ſecond is *obliquus aſcendens*: this ariſeth from the ſharp point of *os pubis*, and from the top of the whole bending of *os Iſtium*, and cleaving to the four uttermoſt ſhort ribs, by a double tendon, clipping the ſtraight

ſtraight muſcle it endeth in the *linea alba*. The fibres of this being oppoſite to thoſe of the former, repreſent a Saint *Andrews* Croſs. The third is *rectum*; this ariſeth from the lower part of the *ſternum*, about the *cartilago xyphoides*, fleſhy: or rather from the cartilaginous ending of the ribs, and marching along the belly, it is inſerted into the brim of the *os pubis*, by a thick and nervous tendon. It hath three interſections, wch ſome accompt ſeveral muſcles; two are about the navell, and one even with the navell. If the fourth be found it is placed under the navell. Theſe interſections firſt ſtrengthen the muſcle as knots do reeds. Secondly, they further the extenſion of it in violent motions: ſo Tailers, to cauſe a cloth ſtockin to ſtretch: and ſo ſit cloſe, cut the cloth bias. The fourth is the *pyramidall*: this is placed above the lower part of the *muſculus rectus*. It ſpringeth from the *os pubis*. Moſt commonly there is found one in

each ſide. Sometimes they are ſo united that they ſeem one broad muſcle; ſometimes they are altogether wanting, and then the ending of this is fleſhy whereas otherwiſe it is tendonous. Theſe ſtrengthen the ends of the *muſculi recti*. The fifth is the *tranſverſus*: this ariſing from the tranſverſe proceſſes of the *vertebra* of the loins below, it is tied to the arch of the hanch-bone, but above the inner part of the ſhort ribs; and paſſing from thence to the *cartilago xiphoides* under the ſtraight muſcle, it endeth by a broad tendon in *linea alba*. This *linea alba* beginning at the *cartilago enſiformis*, paſſeth directly by the navell to the joyning of the *oſpubis*. It is framed of the membranous tendons of all the muſcles of the belly, the ſtraight excepted. But ſeeing the tendons of the muſcles of the right ſide are ſo firmly united to the left, that no ſign of ſeparation can be diſcerned, it is not ſeen but between the two ſtraight muſcles.

The

The muſcles have their denomination from their ſituation and the texture of their tendons. While the body is at reſt, theſe ſtrengthen the parts ſubjacent, encreaſe their heat: in action, firſt, they further the excretion of the excrements: ſecondly, they help the delivery of the infant in labour: thirdly they further ſtrong breathing: fourthly they bend the *ſpina* in violent exerciſes.

CHAP. XVIII.

Of the muſcles of the genitals.

Penis, or the Prick of Man, hath four muſcles, two on each ſide; The firſt is *erector*, or *directo*r: this ariſeth from the inner part of the hanch-bone, and being tied by the ſide to the ligament of the prick, it reacheth to the middle of it. The ſecond is *accelerator*: this ariſeth from the internal knob of *iſchium*, below the lateral ligament of the prick, and from the *ſphincter* of the *anus*, and

and being placed with his fellow under the *urethra*, passeth to the middle of the yard.

The *Clitoris*, or little prick in women, have four muscles. The two uppermost being round, they arise from the internall knop of the *ischium*, and being placed by the laterall ligaments, cause the erection of it. The two lower are broad and smooth, and proceeding from the *sphincter* of the *anus*, are inserted into the brims of the *cunnus*.

The *stones* have two muscles to pull them up: they are called *cremastores*, from κρεμάζω, to hold up. In health they keep the stones wrinkled, whereas in sickness they are flaggy, and hang down. They are thought to spring from the fore and inner brim of the *os illium*: but they seem rather to be the endings of the oblique ascending muscles near to the *os pubis*; which compassing without the productions of the *peritonæum*, pass with the spermatick vessels towards the stone.

The

The Cremaſter in women are ſhorter then in men, and are placed above the production of the *peritonæum*: through this production the round ligaments of the *matrix* paſſeth, which in women is compaſſed with a fleſhy ſubſtance, which reſembleth the cremaſter in men.

CHAP. IV.

Of the Muſcles of the Bladder, and Anus.

THE Bladder hath but one muſcle, called *ſphincter*; it doth compaſs round the neck of the bladder. Above it compaſſeth the *proſtrates*, and is ſeated under them alſo. The fibres are orbicular. If one ſide be taken with the palſie, an involuntary excretion of the urine doth not always follow, becauſe a nerve is implanted into the outſide of the neck of the bladder. In women it reacheth to the hole by the which the urine paſſeth, and it ſeemeth to form it.

The

1. The *anus* hath three muscles. The first is *sphincter*: this is fleshy, and without the straight gut two inches broad, the fibres are orbicular. It doth not spring from any adjacent bone, but is only inserted into *coccyx*. The second and third are called *levatores*; they are placed within the gut, and are large and fleshy. They are tied to the sides of the gut, and reach to the *sphincter*: they possess the distance between the *ischium* and the *os sacrum*.

CHAP. XX.

Of the muscles of the Shoulder-blade.

THE shoulder-blade is moved forward, backward, upwards, and downward. It hath four proper muscles. The first is called *trapezius* or *cucullaris*: this hath its beginning from the lower part of the nowl-bone towards the ear, fleshy, but from the *posterior* processes

ceſſes of the *vertebræ* of the neck, and the eight upper *vertebra* of the breaſt, it ſpringeth membranous and broad, and is inſerted into the *baſis* of the *ſcapula*. The ſecond is *levator*, or *patientiæ muſculus*: this hath its beginning from the tranſverſe proceſſes of the firſt, ſecond, third, and fourth *vertebræ* of the neck, which beginnings being united, are inſerted into the corner of the ſhoulder-blade. The third is *ſerratus minor anticus*: this ſpringing from the four upper ribs before they become cartilaginous: cleaving to theſe be four fleſhy portions repreſenting the teeth of a ſaw, and are inſerted by a broad tendon near to the anchor-like proceſs of the *ſcapula*. The fourth is *rhomboides*; this is placed immediately under the *cucullaris*. This ſpringeth fleſhy from the hinder proceſſes, or *ſpinæ* of three of the *vertebræ* of the neck and ſo many of the breſt, and is inſerted by as broad a fleſhy ending, as the beginning was into the *baſis* of

2.

3.

4.

of the ſhoulderblade. The fifth is *ſerratus major*: this hath its beginning from the eight upper ribs before they become griſtly. The beginnings are fleſhy portions like to the teeth of a ſaw, by which it is inſerted into the like portions of the oblique deſcending muſcle. Then it marcheth fleſhy, by the ribs upwards at the ſides of the breaſt, and is implanted by a large fleſhy end into the whole inner *baſis* of the *ſcapula*. It moveth the ſhoulderblade forward and downward. The beginning muſt be in the breaſt where the fleſhy portions are; becauſe there the nerves are inſerted: and that part is ſteady, which the *ſcapula* is not.

CHAP. XXI.

Of the muſcles of the arm.

THE arm hath five motions, for it moveth backward, forward, upward, downward, and circularly.

circularly. It is moved upward by two erectors, *deltoides* and *ſupraſpinatus*. Firſt, *deltoides ſpringeth* from the middle of the cannel-bone, the top of the ſhoulder, and the whole *ſpina* of the *ſcapula*, and is inſerted into the middle of the ſhoulderbone. The ſecond is *ſupraſpinatus*, or *ſuperſcapularis ſuperior*: this placed in the cavity above the *ſpina* of the ſhoulder-blade, and paſſing under the upper part of the *ſcapula*, is inſerted into the neck of the ſhoulder-bone, which it compaſſeth with a broad tendon. It is pulled down by *latiſſimus*, and *rotundus major*

1.

2.

Latiſſimus, ſo called from its largeneſſe; for with its mate it covereth the whole back. It is called *ani ſcalptor*, or *terſor*; for without theſe this office could not be performed. This ſprings by a broad membranous beginning from the hinder proceſſes of the *vertebræ* of the breſt, beginning at the ſixth, and reaching to the middle of the *os ſacrum*, and upper part of the *os ilium*:

Depreſſors.

illium: then passing upwards, when it is come to that part of the back where the ribs bend, it becometh fleshy, and passeth by the lower corner of the *scapula* where becoming narrower, it is inserted under the upper end of the shoulder-bone by a short broad tendon between the *musculus pectoralis*, and the *rotundus detrahens*. *Rotundus major*, or more properly, *teres major*, because it is long without edges, this springeth from the whole *costa* of the *scapula*, and is inserted into the shoulder-bone, a little below the neck of it.

Movers forward.

It is is drawn forward by *pectoralis* and *coracoideus*. *Pectoralis*, it

1. beginneth from the seventh, sixth, and fifth true ribbes, the *sternum*, and above the half of the cannel-bone, and by a sharp tendon it is inserted into the shoulder-bone, between the *deltoides* and the *biceps*. *Coracoides*, it

2. beginneth at the *coracoides apophysis*, and endeth about the middle of the shoulder-bone.

It

It is moved backward by three: *infraſpinatus*, or *ſubſcapularis*, or *immerſus*, and *rotundus minor*: *infraſpinatus*, or *ſubſcapularis*, it poſſeſſeth the whole cavity of the *ſcapula*. It ſpringeth from the *baſis* of it, fleſhly, and ſo continuing, paſſing forward; but becoming ſtill narrower to the neck of the *ſcapula*, at the laſt it getteth a broad tendon, by the which it is inſerted into one of the ligaments of the arm. *Rotundus minor*, or *ſuperſcapularis inferior:* this ariſing from the *baſis* of the *ſcapula* by a fleſhy beginning, marcheth forward; and becoming narrower is inſerted into the fourth ligament of the arm, by a broad and ſhort tendon. *Pullers backward.*

One thing is to be noted, that the tendon of *muſculus latiſſimus*, together, with the tendon of *muſculus temporalis*, cauſe that cavity which is ſeen in the cavity of the armpit; for the tendon of the *latiſſimus* frameth the inſide, but that of the *temporalis* the outſide of the cavity. *Nota.*

CHAP.

CHAP. XXII.

Of the Muſcles of the Ulna.

THE elbow hath two bones, *ulna* and *radius*. The ulna ſerveth for flexion, and extenſion: but the *radius* for pronation, and ſupination. The *ulna* is bended by two, to wit, *biceps*, and *brachieus interus*. *Biceps* hath two beginnings from the ſhoulderblade.

Benders of ulna.

1. The firſt is that which is outward, tendonous and round; it ſpringeth from the upper brim of the hollowneſs of the *ſcapula*, and marcheth under the ligaments of the joynt, above the top of the ſhoulderbone by the chink in the bone made for that purpoſe, where it is wrapped by a ligament which riſeth from the hollowneſs. The ſecond head is broader then the firſt, framed partly of a tendon, and partly of fleſh; it ſprings from the anchorlike proceſs of the ſhoulderblade; then deſcending by the

inner

innerpart of the top of the *ſcapula*, it meeteth with the former; below the head of the ſhoulderbone, it becometh a ſtrong fleſhy muſcle: afterward ending in a thick, round, and ſtrong tendon, it is inſerted into the long knob, under the upper end of the *radius*. This is that tendon which cauſeth great pain if it be pricked in phlebotomy. *Brachiæus internus* lying under the *biceps*, riſing from the middle of the ſhoulderbone, untowh ich it cleaveth firmly: it is inſerted both into the *ulna* and *radius* where they meet.

The *ulna* is extended by four muſcles, *longus*, *brevis*, *brachiæus externus*, and *cubitalis*. *Longus* ariſeth from the lower brim of the *ſcapula* near to the neck, where it hath a peculiar hollowneſſe; and endeth in the knob of the elbow. *Brevis* riſing from the hinder part of the neck, of the ſhoulderbone, endeth in like manner in the *olecranum*; both theſe make but one ſtrong tendon. *Brachiæus externus* placed under theſe two: it

Extenders. 1. 2. 3.

it is placed on the outside of the shoulderbone: it is confounded with the other two, and endeth where they do, but this seemeth to *Spigelius* (*de human. corp. fabrica. lib.* 4. *c.* 15.) to be but a fleshy portion arising about the middle of the shoulder, and no peculiar muscle.

4. *Cubitalis*, or *anconeus* it is placed in the hinder part of the bending of the elbow, which is called ἀγκὼν, answereth to the *musculus poplitæus:* this ariseth from the lower and hinder part of the shoulder-bone, and placed between the *ulna* and the *radius*, it endeth by a nervous tendon in the laterall part of the elbow an inch below the *olecranum*. The extending muscles have straight fibres.

CHAP. XXIII.

Of the Muscles of the Radius.

THe *Radius* hath two sorts of muscles: for some are called *pronatores*,

pronatores, or pullers down: some *supinatores*, or raisers up. The *pronatores* are two in number: The first is, *pronator superior rotundus*: this springeth from the root of the inner knob of the shoulderbone, and from the inner side of the *ulna*, where it is joyned to the armbone; and endeth obliquely about the middle of the *Radius* by a membranous tendon. The second is *pronator inferior quadratus*: this is altogether fleshy. This springeth from the lower and inner part of the *ulna* two inches broad; then marching obliquely above the ligament which joyneth the *radius* to the *ulna*, it endeth in the inside of the *radius*. The ending is as broad as the beginning; wherefore it is called *quadratus*, or, four square.

The pronators. 1. 2.

The *supinatores* are in like manner two. The first is *supinator longus*, so called, because of all the muscles which march by the *ulna*, it hath the longest belly. This springeth fleshy from the edge of the

Supinators. 1.

the inner knob of the *ulna*; and marching obliquely under the *radius*, is implanted by a membranous tendon into the upper part of the lower *appendix* of the *radius*, bending somewhat to the innerside.

2. The second is *ſupinator brevis*: this ſpringeth from the outward part of the ligament of the lower end of the armbone, and from the hinder proceſs of the *ulna*; being without membranous, and within fleſhy, it is inſerted into the middle of the *radius*.

CHAP. XXIV.

Of the muſcles of the Wriſt.

Benders.

THE Wriſt is bended by two muſcles in the inſide. The

1. firſt is *cubitæus internus*: this doth ariſe by a fleſhy and nervous beginning from the ſharp inner knob of the ſhoulderbone, then paſſing fleſhy by the length of the *ulna*, it doth end by a tendon, partly

partly nervous, and partly fleshy, in the fourth bone of the first rank in the Wrist. The second is *brachiæus internus*: this arising from the same place, and passing alongst the *radius*, is inserted into that bone of the back of the hand which doth hold up the fore-finger. 2.

Two externall muscles stretch out the *carpus*. The first is *radiæus externus, sive bicornis*: this ariseth from the sharp edge of the outer knob of the shoulder bone in the upper part of it by a broad beginning: then becoming fleshy, it passeth to the middle of the *radius*, where it becometh a strong tendon, which presently is divided into two tendons more broad then thick. Both these pass a little asunder by the *radius* under the ligament, whereof one is inserted into the bone which stayeth the first finger, and the other into the bone which stayeth the middle finger. The second is *cubitæus externus*: this hath its beginning *Extenders.* 1. 2.

from the root of the external knob of the ſhoulderbone, in the upper end of it: when it is come to the wriſt, it becometh a ſtrong round tendon, and is inſerted into the upper part of that bone which ſtayeth the little finger, not far from the wriſt.

CHAP. XXV.

Of the Muſcles of the Palm of the Haad.

THis is thought to have two muſcles. The firſt is *palmaris*; this ariſeth from the inner knob of the ſhoulderbone round and nervous and placed under all the muſcles, it monnteth over the *ligamentum annulare*. Then it is dilated into a broad membrane, which cleaveth firmly to the skin of the palm of the hand, for firm apprehenſion, and quickneſs in feeling, and endeth about the firſt joynts of the fingers. The ſecond is *caro quadam quadrata*, or a fourſquare fleſhly

fleshy substance: this springeth from the *membrana carnosa* under *mons lunæ*, where the eight bone of the wrist is placed. From thence its is carried under the *musculus palmaris*, to the middle of the palm of the hand, and inserted into the outside of that tendon which carrieth the little finger from the rest. This representeth two or three muscles, and serveth for the hollowing of the palm of the hand, to form *Diogenes* his cup by, bringing the fleshy eminence under the little finger unto the tenar.

CHAP. XXVI.

Of the muscles of the four fingers.

THE fingers are bended, extended and moved laterally. Now the muscles which perform these motions either belong to the other fingers or to the thumb. The fingers are bended by two muscles. The first is *sublimis*: this springing from the inside of the

Benders of the four fingers.

1.

inner knob of the ſhoulder-bone; and about the wriſt it produceth four tendons, which end about the ſecond joynts of the fingers. Theſe are hollow to give way by a chink to the tendons, of the

2. *profundus*. The ſecond is *profundus*, this ariſeth from the upper parts of the *ulna* and *radius* under the joynt and being ſeparated into four tendons, they are implanted into the third joynts of the fingers, under the *ligamentum annulare*, by the tendons of the *muſculus ſublimis*, under which they lye. The toes are extended by three muſcles, whereof one is common, and two proper. The common is *extenſor magnus*: this ariſing from the outer knob of the arme-bone, about the wriſt, is divided into four tendons, which end in the lowermoſt joynts of the fingers. The proper are two; the firſt is *indicator*, becauſe it belongeth to the fore-finger. It ariſeth from the outward and middle part of the *ulna*, & by a double tendon it end-

Extenders.

endeth in the second joynt of the fore-finger: but one of the tendons becometh one with the tendon of the *extensor magnus*. The second is *auricularis*, because it belongeth to the little finger. It ariseth from the upper part of the *radius*, and marching between the *ulna* and the *radius*, it is inserted outwardly by a double tendon into the little finger.

Movers laterally.

The fingers are laterally moved two manner of waies: for either they are brought to the thumb, or they are carried from it. These motions are performed by two sorts of muscles, called *interossei*, and *lumbricales*. The *interossei*, so called, because they are placed between the bones of the *metacarpium*: they are fleshy and round, and spring from the bones unto the which they are tied: they pass straight alongst these bones: these when they are come to the roots of the fingers, they pass into tendons which cleave to the sides of the fingers, and end in the second joynt by their ten-

Interossei.

don. Six are placed between the three distances, between the bones of the *metacarpium*, so that there are two between each distance: whereof one doth pass to the lower, one to the upper part of the tendon. The middle & ring finger receiveth two tendons, but the fore and little finger but one. The *lumbricales* are in number four: these arise in the distances of the tendons by the wrist, & meet with the *interossei* about the first joynt of every finger. The first is inserted into the ring finger; the second and third to the middle finger; but the fourth to the fore-finger: these are not one with the tendons of the *interossei*.

Abducing muscles two.

Besides these muscles, the fore-finger & the little finger have one *musculus abducens*. That of the forefinger springeth from the middle of the *ulna*: then near the wrist it is parted into two tendons which pass under the ligament. The upper is implanted at the root of the forefinger; but the lower into the root of the middle finger.

finger. That of the little finger, called *hypothenar*, is placed in the palm of the hand under the little finger. It is ſhort and ſtrong; It ſpringeth fleſhy from the fourth bone of the *metacarpium*, and is implanted by a nervous tendon into the outſide of the firſt bone of the little finger.

CHAP. XXVII.

Of the muſcles of the Thumb.

THe thumb is extended by two muſcles. The firſt is that which is called *longior*; this ariſeth fleſhy from the outer and higher ſeat of the *ulna*, where the rough line is; & the membranous which tieth together the *ulna* and *radius*: from thence it is carried obliquely to the *radius*, and before it come to the *appendix* of it becometh a round tendon, which paſſing under the annular ligament, marcheth according to the length of that ſide, which is next to

Extenders. 1.

the fore-finger, and is inſerted into the third bone of it. The ſecond is *brevior*: this extendeth the ſecond and third joynt of the thumb. It ariſeth from the ſame line fleſhy: it paſſeth obliquely above the *radius*. By one tendon it is implanted to the root of the firſt joynt of the thumb; by the other becoming membranous, it cleaveth faſt to the ſecond and third bone of the thumb.

Benders. 1. It is bended by one muſcle; which ſpringing from the inner part of the *ulna*, is implanted into the firſt & ſecond joynt of the thumb. This being fleſhy, which *Spigelius de hum. corp. fabric. l. 4. c.* 19. divided into five muſcles, together with the *abducens* of the thumb, make up *monticulus lunæ*.

Monticulus lunæ. *Movers laterally.* It is laterally moved by two muſcles. The firſt is called *thenar* or *abducens*, this ſpring from the inner part of the bone of the wriſt, which ſtayeth the thumb, by a nervous beginning: then becoming

ing fleshy, it is inserted into the first joynt of the thumb by a membranous tendon: this draweth it from the fore-finger. The second is *antithenar*, or *adducens*: this is seated outwardly, in the distance between the thumb and fore-finger. This doth arise from the outer and inner side of that bone which stayeth the first finger; and being fleshy is inserted into the whole inner side of the first joynt of the thumb; this draweth the thumb to the fore finger. 2.

CHAP. XVIII.

Of the Muscles of the Thigh.

THE Thigh is bended forwards by three muscles. The first is *psoas*, or ψοα, and *lumbaris*: that lyeth in the inner part of the *abdomen*, upon the *vertebræ* of the loins. It ariseth from the transverse processes of the two lowermost spondils of the back, and marching by the inside of *os ilium* Benders forward. 1.

it is inserted into the lesser *rotator*.

2. The second is *iliacus internus*: this springing from the inside of *os ilium*, and being joyned to the *psoas* by his tendon, it endeth before between the greater and lesser *rotator*.

3. The third is *pectineus*: this arising from the upper part of the *os pubis*, is implanted a little below the neck of the thigh-bone.

Benders backward.

It is bended backward by the three *glutii*, which make up the buttocks.

1. The first is the outermost and the greatest: it springeth from the *coccyx*, from the edge of *os sacrum*, and from the halt of the bending of *os ilii*, and is inserted four inches below the great *rotator*.

2. The second is the middlemost: this springeth from the outer part of *os ilium*, and is inserted into the outer side of the greate *rotator*.

3. The third is the lowermost; this springeth a little lower, from the outer part of *os ilii*, and is implanted into the upper part of the great *rotator*.

Drawers into the insie.

It is drawn to the inside by the

musculus

musculus triceps: this is the biggest of all the muscles of the body, and hath three beginnings, which end in one musculous tendon. The first head doth proceed from the upper part of the share-bone, and lying by the *pectineus*, is inserted into the middle of the thigh-bone. The second springing from the middle of the same bone, being lesser, is inserted a little below the neck of the thigh-bone. The third arising from the lower part of the same bone, being of all the lowermost and biggest, reacheth to the end of the thigh-bone by a very strong tendon. These are inserted into the hinder line which is in the bone. *Spigelius de hum. corp. fabric. l. 4. c. 22.* addeth another, which he termeth *lividus*: this proceedeth from the fore-part of *os pubis*, where the cartilage is, which joyneth the two bones by a broad and fleshy substance. As it descendeth obliquely, it becometh a large tendon, but short: and marching down by the inner-part of the thigh, it is inserted 2.

ted into the middle of the thigh-bone.

Turners towards the outside.

It is turned towards the outside by four small muscles called *quadrigemini*. They are placed above the articulation of the thigh one by another. The first is called by others *Iliacus externus*, and from the figure *pyriformis*; it is longer than the rest; it ariseth from the lower and outer part of the *os sacrum*. The second ariseth from the knob of *ischii*. The third ariseth from the same part. These are inserted into the hollowness of the great *rotator*. The fourth is called *quadrigeminus quadratus*, more fleshy and broader than the rest: it lieth two inches distant from the third: it ariseth from the inner part of the knob of the *ischium*, and is implanted into the outward part of the great *rotator*.

1. 2. 3. 4.

Rowlers obliquely.

It is rowled oblique by two muscles called *obturatores*. The first is *obturatar internus*, this rowleth it outward: this ariseth from the inner circumference of the *os pubis*, and is inserted into the

1.

the cavity of the great *rotaror*. The second is *obturator externus*: this ariseth from the external circumference of the hole of the *os pubis*, and returning by the neck of the thigh-bone, as by a pulley it endeth in the cavity of the great *rotator*, under the fourth *quadrigeminus*.

CHAP. XXIX.

Of the muscles of the Leg:

THE shank hath thirteen Muscles, whereof four do bend it. *Benders.* The first is *seminervosus*: this beginneth at the knob of the *ischium*, and endeth in the inner side of the *tibia*, towards the backside. 1. The second is *semimembranosus*: it proceedeth eth from the same knob partly nervous, and partly membranous; but it marcheth by a broad tendon to the inner and hinder-part of the *tibia*. 2. The third is *biceps*: this ariseth from the same knob of the *ischium*; and being 3.

ing carried by the outside of the *tibia* in man about the middle of the thigh, it becometh fleshy; and by one tendon it is inserted into the outside of the *tibia*. That this tendon may be the more safely carried, the thigh bone is griped and covered with a smooth and slippery ligament, the fourth is *posticus gracilis*: this ariseth from the line where the share-bone and hip-bone are joyned together, and marching down in the inner side of the thigh, it is inserted into the inside of the *tibia*. In fat persons this seemeth to be a stiff sinew, when they stride much. The shank is extended by five muscles. The first is *membranosus*: this proceeding from the upper part of the edge of the *ischium*, doth compasse both the thigh and the leg; wherefore it is called *facia lata*, because it covereth all the muscles of the thigh and leg, reaching to the foot. If it be nipt by sharp humours, great pain is caused.

Extenders. 1.

The

The ſecond is *longus*: this ariſeth from the upper and fore-part of the edge of the bending of the *os illium*, and paſſing by the inſide of the thigh obliquely, it endeth in the inſide of the leg: and becauſe it is thought to bring in the leg, that it may be laid upon the other, ſome call it *ſutorius*, the Shoo-makers muſcle: but it may be more truely called *ſartorius*, the Taylors muſcle; for when they ſow upon their ſtalls they ſit croſſe-legged. The third is *rectus gracilis*; this ſpringing from the lower brim of the *os ilium*, and paſſing ſtraight along the length of the thigh endeth in the *patella* by a broad tendon. The fourth is *vaſtus duplex*: theſe are placed at the ſides of the *gracialis*, whereof the one is called *externus*; this ſpringeth from the root of the greater *trochanter*, it endeth a little below the *patella*, outwardly. The other is called *internus*; this ariſeth from the root of the leſſer *trochanter*, and endeth

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4.

5.

endeth in the inside of the leg, a little below the *rotula*. The fifth is *crureus*: this lieth under the two *vasti*; springeth from the fore-part of the *os femoris*, between the two *trochanters*, it endeth in the *rotula*. These four muscles, the *rectus gracilis*, the two *vasti*, and the *crureus*, meeting about the knee, become one strong tendon, which covereth the *patella*. One thing is to be noted, that the muscles which extend the leg are stronger then those which draw it in, that the weight of the body may be the better upholden when we stand.

7. To these we may adde that muscle which is called *popliteus*, or *suppopliteus*, which moveth the leg obliquely: this lyeth in the hollow of the ham, above the head of the *solæus*: it springeth from the outer knob of the thigh-bone, and is inserted in the upper and hinder part of the leg, which it clippeth firmly.

CHAP.

CHAP. XXX.

Of the muſcles of the Inſtep.

THE Inſtep is bended when it is drawn upwards. To perform this motion it hath two: the firſt is *tibiæus anterior:* this ariſeth from the upper *epiphyſis* of the *tibia*, near to the *fibula*, and cleaving unto the whole *os tibiæ*, about the middle of it becometh a tendon, which paſſing under the annular ligament of the Inſtep, is divided in two tendons; whereof the one is inſerted into the firſt of thoſe bones which are called *innominata*, without a proper name: the other is inſerted into the bone ſet before the thumb. The ſecond is *peronæus anterior*: this ariſeth from the outer and middle part of the ſmall focill, and being carried through the chink of the outer ankle, it is inſerted into the bone of the Inſtep, which ſtayeth the

Benders.

1.

2.

the little toe: it hath two heads and two tendons. The foot is extended when it is drawn backwards: To perform this motion it hath two muscles. The first is *gemellus externus*, or *gastrocnemius externus*: this muscle hath two heads, that have seed-bones not far from their beginnings. The first head is under the ham, from the inner part of the end of the thigh bone, where it is fleshy and broad. It marching down by the back and inner part of the *tibia*, when it is come to the middle of it, it becometh tendonous, and is joyned with the tendon of *gemellus internus*. The other head likewise ariseth under the ham, but from the outer part of the end of the thigh-bone. It passing down by the outward and back part of the Leg, becometh tendonous a little above the tendon of the former; then being joyned to the former; they become one strong, broad, and sinewy tendon, which is inserted into the

Extenders. 1.

the heel. The second is *gemellus externus*, or *gastrocnemius internus*: this lyeth under the former, and is of a livid colour. It springeth from the *appendix* of the lesser focil by a strong nervous substance: doth become thicker, but when it hath passed the middle of the *tibia* it becometh narrower, and tendonous; and a little above the heel it is so united to the tendon of the former *gemellus*, that both seem to be but one, and is inserted into the heel. By this tendon Butchers hang up the beasts killed. The instep is moved obliquely by two. The first is *tibius posticus adducens pedem*, or *Nauticus*, because Sailers use it much when they go up by the ropes. It springeth both from the greater, and lesser focill, and from the ligament which tyeth these together, it being tyed to this tendon, lyeth amongst the hinder muscles, and near to the inner ankle it becometh tendonous: the passing by it, it goeth to the soal

Movers obliquely. 1.

ſoal of the foot, and is inſerted into the lower part of the bone which is next to the *cubiforme*.

2. The ſecond is *peroneus vel fibulæus poſticus*: this ariſeth from the upper, but hinder part of the ſmall focill, by a nervous and ſtrong beginning; and cleaving to the outſide of the perone, it paſſeth down round aud fleſhy: the outer part is of a livid colour, but the inner of a red. When it is come to the middle of the focill it becometh tendonous, which behind under the outward ankle, obliquely marching; is inſerted under the ſoal of the foot into the bone ſet before the great toe. To theſe may be added the muſcle which is called *plantaris*, becauſe it covereth the whole ſoal of the foot. It lyeth under the *gemellus externus*, and ſpringing from the outer part of the end of the thigh-bone, under the ham by a round fleſhy beginning, then paſſing within the leg, between the two *gemelli*, and from thence to

Plantaris muſculus.

to the ſoal of the foot, it cover-
eth all the toes at the firſt joynt,
and is inſerted into all the toes. It
anſwers *palmaris*.

CHAP. XXI.

Of the Muſcles of the Toes.

THE toes are extended by two. The firſt is *longus*, it doth ariſe by a nervous and ſharp beginning from the fore *appendix* of the great focill, and cleaving to the ligament which uniteth the two focills, it goeth down to the foot. Firſt, it paſſeth under the tranſverſe ligament, then it being divided into four tendons, they are inſerted into the third and ſecond joynt of the four toes to extend them. The ſecond is *brevis*; this lieth under the former: this hath its beginning from the tranſverſe ligament, fleſhy and broad, and by its four tendons it is inſerted

Extenders.

1.

2.

ted into the first joynts of the four toes. The benders of the toes are in like manner two. The first is *longus*, or *perforans*, it lieth under the *gemellus internus*, and ariseth from the hinder part of the *tibia*, under the ham by a long and a fleshy beginning; passing according to the length of the *tibia* unto the which it cleaveth, when it hath the middle of it, becometh tendonous: then under the inner ankle, and the ligament which reacheth from the lower *appendix* of the *tibia*, it goeth by a hollownesse of the heel to the soal of the foot; where being divided into four tendons, it passeth through the holes of the *flexor Brevis*, and is inserted into the third and last joynt of the four fingers. The second is *brevis*, or *perforatus*: this springeth from the inner part of the heel-bone, and when it hath passed the middle of the foot, it is parted into four round tendons which are inserted

Benders. 1. 2.

serted into the second joints of the four toes, being perforate to give way to the tendons of the former muscles to passe to the third joynt. Thirdly, *lumbricales* four: these spring from the tendons of the *perforans*, small and round, and are inserted by a small tendon into the side of the first joynt, which they help to bend. The fleshy substance, which filleth up the cavity of the first joynts of the four fingers, seemeth much to further the action of these muscles: for springing by two sharp beginnings from the lower part of the heelbone, it is inserted into the beginnings of the four *lumbricales*: Lumbricales. 4.

The *interossei* are placed between the bones of the instep. These *interossei*, so called, because they are placed between the bones, in the foot, are ten in number; whereas there are but eight in the hand, because the instep hath one bone more then the wrist. Each of them

them doth ſpring from the ſide of the bone of the inſtep where it is placed; and all marching according to the length of the bone fleſhy, they are inſerted into the roots of the fingers by ſhort tendons, and ſomewhat broad. If the inner be drawn together, the finger is brought in; but if the outer be moved, the finger is carried from the reſt. Between the four diſtances between the bones, there are eight ſuch muſcles; at the outſide of the thumb one, and one other at the outſide of the little finger. Beſides theſe you may obſerve a ſmall tranſverſe muſcle which paſſeth from the thumb over the firſt joynts of the fingers to the little finger. It ſeemeth to have a twofold uſe; firſt, to tye together the bones of the firſt joynts of the toes. Secondly, they ſave their tendons from harm when we tread upon hard things.

The tranſvers muſcle. The invention of this is aſcribed to Caſſerius *by* Bartolinus, l. 4. c. 14.

Extenders of the great toe.

The great toe hath peculiar muſcles. The firſt is *extenſor*; this ſpringeth by a fleſhy beginning from the outſide of the great ſo-

1. cill,

cil, where it parteth from the *fibula*. It cleaveth fast to the ligament which ties the *tibea* to the *fibula*, and marching alongst the upper part of the foot, it is inserted into the whole upper part of the thumb. The second is *flexor*: this springeth from the back part of the *fibula*, about the middle of it fleshy and pointed; then becoming thicker, about the inner anckle it becometh tendonous and is inserted into the last joynt of the thumb: before it come to the second joynt it hath a larger seed-like bone then the joynts of the rest of the fingers have. The third is *adductus pollicem*, which draweth the great toe from the rest, to the inner part of the foot. It springeth nervous from the ligament which tieth together the heel-bone, and the *talus*, it cleaveth to the bone set before the thumb, and is inserted by a round tendon into the outside of the first joynt of the great toe. The last is *abductor minimi digiti*: this

2.

3.

4.

being placed in the outside of the foot it proceedeth from the outerpart of the heel-bone, where the knob is nervous; but becoming fleshy, and being tied to the bone of the *metatarsus*, which stayeth the little toe it is inserted by a round tendon into the outside of the first joynt of the little toe.

The

The number of the Muſcles of each part.

THE eye lid hath	4
The occipitals on each ſide	1
Each eye hath	6
The noſe hath	6
Theſe are in number	17
Both the lips have	10
The lower jaw hath	10
The ear hath	10
The tongue hath	8
The bone of the tongue hath	8
The *larynx* hat	10
The *uvula* hath	2
The *pharynx* hath	7
Theſe are in number	65
The head hath	14
The neck hath	8
The breſt hath	30
The loins have	6
The *abdomen* hath	10

The prick hath	4
The *clitoris* hath	4
The ſtones have	1
The bladeer hath	1
The *anus* hath	3
Theſe are in number	81
The ſhoulder-blade hath	5
The ſhoulder hath	8
The *ulna* hath	6
The *radius* hath	4
The wriſt hath	4
The palm of the hand hath	2
The four fingers have	19
The thumb hath	5
Theſe are in number	53
The thigh hath	11
The ſhank hath	13
The inſtep hath	7
The toes have	23
Theſe are in number	54
The total ſum of all the muſcles of the body of man	270

AN ENUNERATION Of all the *Muſcles of the whole body.*

EAch *eye* hath one frontal to liſt it up: the firſt is called *orbicularius major*, under the frontal; and two called *ciliares*, one in each eye-lid to ſhut it. *The muſcles of the eye-lids four in each.*

The occipitals which meet theſe, are two, one on each ſide.

As for the *ear*, in the outſide there are four pair: firſt, *par attollens*, liſting it up: ſecondly, *par deprimens*, pulling it down: thirdly, *par adducens*, which moveth it forward: fourthly, *par abducens*, which pulleth it backwards. In the inſide there are two, *externus*, the external; and *internus*, the internal. *The muſcles of the ears. 10.*

The *eye* hath ſix muſcles,

four straight, and two oblique.

The muscles of the eye, 6.

The first of the straight is called *attollens*, or *superbus*.

The second is *deprimens*, or *humilis*.

The third *Adducens*, or *bibitorius*.

The fourth *Abducens*, or *indignatorius*.

The oblique are two:

1. *Obliquus major, seu superior.*
2. *Obliquus minor, seu inferior.*

The muscles of the nose, 6.

The *nose* hath six muscles.

Erectores, or pullers upwards two.

Dilatatores, or openers, two.

Constrictores, or pullers together two, one in each side.

The muscles of the lips, 10.

The *lips* have two common muscles, and four proper.

Of the common, the first is called *zygomaticus*, the second *bucco*.

Each *lip* hath four proper:

1. *Attollens*, which beareth up the upper lip.
2. *Deprimens*, which beareth the lower lip downwards.
3. *Orbicularis*, or *sphincter*, which

which maketh up the fungous substance of the lips.

4. *Abducens*, or drawing aside.

The *lower jaw* is moved upwards by three muscles: the *temporalis*, the *pterigoideus internus*, and the *masseter*. *The muscles of the lower jaw, 10.*

It is pulled down by *digastricus*, and *musculus latus*.

It is pulled forward by *pterigoideus externus*.

The *tongue* hath eight muscles, four on each side. *The muscles of the tongue, 8.*

1. *Genioglossus*, which draweth it forwards.

2. *Miloglossus*, it helpeth the thrusting of it out.

3. *Basiglossus*, or *hypsiglosseus*, by the which it is pulled backwards.

4. *Styloglossus*, or *ceratoglossus*, by the which it is moved to the sides.

The *os hyoides* hath four muscles on each side. *The muscles of the bone of the tongue 4.*

1. *Sternohyoides*.
2. *Genihyoideus*.
3. *Coracoidæus*.
4. *Styloceratoideus*.

The muscles of the larynx.

The *larynx* hath four common muscles, and five proper.

Of the common there are,

1. Two *hyothyroidæi*, which pull up the *larynx*.

2. Two *Bronchii* which pull it down.

Of the proper,

1. *Cricothyroidæus anticus.*

2. *Crycothyroides lateralis.*

3. *Cricoarytenoides posticus.*

4. *Thyroarytenoides sive glottæus.*

5. *Arytenoides.*

The muscles of the Pharynx. 7.

The *Pharynx*, or beginning of the *œsophagus* hath seven muscles, three pairs, and one without a match.

Of the pairs,

1. *Shenopharingæus.*

2. *Cephalopharyngæus.*

3. *Staphylopharyngæus.*

That which hath no match is called *œsophagæus.*

The *gargareon* hath two Muscles.

1. *Pterystaphilinus externus*, this holdeth it up.

2. *Pte-*

2. *Pterystaphilinus internus*, this doth the same.

The muscles of the uvula. 2.

The *head* hath two sorts of muscles: for some are common, and some are proper: the common which together with the neck move the head; and these are the muscles of the neck.

The muscles of the head. 4.

The proper are those which onely move the head, when the neck remaineth immoveable: and these are in number fourteen. It is pulled forward by the two *mastoidæi:* these are placed before; these bend it forward. Behind twelve are placed.

Proper muscles. 14.

1. *Splenius, vel triangularis.*
2. *Complexus, vel trigeminus.*
3. *Recti majores*, two.
4. *Recti minores*, two; these stretch out the head.
5. *Obliqui majores, sive superiores*, two.
6. *Obliqui minores, sive inferiores*, two: these wind the head about.

The neck hath four on each side.

The muscles of the neck, 8.

It is bended by two pairs.

1. *Par longum.*
2. *Par ſpinatum, triangulare, ſcalenum.*

It is extended by two pairs,

1. *Semiſpinatum.*
2. *Tranſverſarium.*

Seeing 64. muſcles ſerve for one ſide of the head and neck, there muſt be 128. for both the ſides.

The trunk of the body hath 46 muſcles for one ſide.

The muſcles of the breaſt. As for the breſt, firſt, theſe dilate it.

1. *Subclavius.*
2. *Serratus major.*
3. *Serratus poſticus ſuperior.*
4. *Serratus poſticus inferior.*
5. *Intercoſtales externi*, fifteen in number, which are as one muſcle.

The breſt is contracted by fifteen in number.

1. *Sacrolumbus.*
2. *Semiſpinatus*, or *triangularis.*

The internal intercoſtals, in number thirteen.

Diaphragma.

Double

Double this number, and you shall have 32.

The loins are bended by the *triangulares*, one on each side. *The muscles of the loins.*

They are extended by four, two on each side. *The muscles of the belly, 10.*

1. *Semispinatus.*
2. *Sacer*: two of them on each side.

The *abdomen* hath five on each side.

1. *Obliquus ascendens.*
2. *Obliquus descendens.*
3. *Rectus.*
4. *Transversalis.*
5. *Pyramidalis.*

The stones have two cremasters to elevate them. *The muscles of the stones, 2.*

The prick hath two, on each side. *The muscles of the prick, 4.*

1. *Erector*, or *Collateralis.*
2. *Accelerator*, or *interior.*

The *bladder* hath one, the *sphincter.* *The muscles of the bladder, 1.*

The *anus* hath three muscles: one to purse it in, called *sphincter*; and two to pull it up, called *levatores.* *The muscles of the anus, 3.*

Double this number, and you shall have 92.

The

The muscles of the Arm.

The arm hath 44. muscles.

The muscles of the shoulder-blade, five on each side.

The shoulder-blade hath five muscles on each side.

1. *Trapesius*, for sundry motions.
2. The proper *levator*, or lifter up.
3. *Rhomboides* which draweth it backwards.
4. *Serratus minor anticus*, drawing it backwards.
5. *Serratus major.*

The muscles of the shoulder. 8.

The *brachium* or shoulder hath eight.

1. *Deltoides.* } moving it
2. *Supraspinatus.* } upward.

3. *Latissimus.* } drawing it
4. *Rotundus major.* } downward.

5. *Pectoralis.* } pulling it for-
6. *Coracoides.* } ward.

7. *Rotundus minor.* } pulling
8. *Immersus*, or *infraspinatus.* } it back-ward.

BIBLIOTHECA BODLEIANA

The

The *elbow* hath ten muſcles. The *ulna* hath ſix. *The muſcles of the ulna. 6.*

1. *Biceps.*
2. *Brachiæus internus.* } bend it.

3. *Longus.*
4. *Brevis.*
5. *Brachiæus externus.* } extend it.
6. *Angonæus.*

The *radius* hath four, *The muſcles of the radius, 4.*

1. *Pronator rotundus ſuperior.*
2. *Pronator inferior quadratus.*
3. *Supinator longus.*
4. *Supinator brevis.*

The *carpus*, or wriſt hath four muſcles. *The muſcles of the wriſt, 4.*

1. *Cubitæus internus.*
2. *Brachiæus internus.*

3. *Radius externus, ſive bicornis.* } theſe extend
4. *Cubitæus externus.* } it.

The fingers have eighteen muſcles. *The muſcles of the fingers, 18 in each hand.*

1. *Sub-*

1. *Sublimis.* } by these they
2. *Profundus.* } are bended.

3. *Communis extensor magnus.*
4. Proper to the fore-finger or *indicator,* } these extend the
5. Proper to the little finger, or *auricularis.* } fingers.

6. *Interossei.*
7. *Lumbricales,* 4. } these partly part them, partly draw them together.

8. *Abductor digiti parvi.*
9. *Abductor indicis, sive indicator.*

The muscles of the thumb, 6

The thumb hath six muscles,

1. *Longus.* }
2. *Brevis.* } these extend it.

3. One it hath to bend it.
4. *Thenar* bendeth it forward.
5. *Antithenar* bendeth it backward.

Double

Double the number of 42. the number of the muſcles of one arm, and you ſhall find 84. muſcles of them both.

The thigh hath ten muſcles.

The muſcles of the thigh, 10.

1. *Pſoas.*
2. *Iliacus.*
3. *Pectinæus.*

} theſe bend it forward.

4. *Glutius maximus.*
5. *Glutius medius.*
6. *Glutius minimus.*

} theſe bend it backwards.

7. *Quadriceps*, or *quadrigemini*, 4. ſmall muſcles.

} theſe bend the thigh outward.

8. *Triceps*, this bendeth it inwards.

9. *Obturator internus*, this rowleth it outwards.

10. *Obturator externus*, this rowleth it inwards.

Double the number 10. and you ſhall have 20. muſcles for both thighs.

The muſcles of the leg. Of the tibia 11.

The leg hath 42 muſcles.

The *tibia* hath 11.

1. *Semi-*

1. *Seminervosus.*
2. *Semimembranosus* } these bend
3. *Gracilis internus, seu posticus.* } it.
4. *Biceps.*

5. *Membranosus, seu facia lata.*
6. *Sutorius, sive longus.*
7. *Vastus externus.* } these extend it.
8. *Vastus internus.*
9. *Rectus gracilis.*
10. *Crureus.*

The muscles of the feet, 9.

11. *Suppopliteus*, or *popliteus*, this moveth it obliquely.

The instep hath eight muscles.

1. *Tibæus anterior.* } these bend
2. *Peronæus anterior.* } it.

3. *Gemelli due* or the twins. } these extend it.
4. *Plantaris.*
5. *Solæus.*

6. *Tibæus posticus.* } these move it obliquely.
7. *Peroneus posticus.*
8. *Plantaris.*

The

The toes have eighteen muſcles.

1. *Longus.* } theſe bend
2. *Brevis.* } them.

3. *Sublimis.* } theſe extend
4. *Profundus.* } them.

5. *Interoſſei* eight theſe bring them together and ſever them.

6. *Lumbricales* four. }
7. *Caro muſculoſa*, or the muſculous fleſh. } theſe draw
8. *Tranſverſalis.* } them to-
9. The drawer in of the little toe. } gether.

The muſcles of the toes, 23.

The great toe hath four muſcles

1. *Extenſor*, or extender.
2. *Flexor*, the bender.
3. *Adducens*, that which draweth to the reſt.
4. *Abductor minimi digiti*, that which draws the little finger from the reſt.

The muſcles of the great toe, 4.

Double the number of 42 expreſſing the numbers of the muſcles ſerving for one leg, and you ſhall have the number of 84. which is the number of the muſcles of both the legs.

THE

THE EXPLICATION of some *APPELLATIONS* OF THE MUSCLES And some other parts of the *Body*.

ANcyroides, *anchorlike.*
Ancon, *the bending of the elbow.*
Acromium, *the upper part of the shoulder-blade.*
Artenoidæus, *because it beginneth and endeth in the ewarlike cartilage.*
Bronchus, *the lower part of the wind-pipe.*
Biceps, *because it hath two heads.*
Ceratogloſſus, *because it ariſeth from*

from the points of the bone of the tongue, and is inserted into the tongue.

Coracohyoidæus, *because it springeth from the process of the shoulder-blade like the crowes bill, and is inserted into the bone of the tongue.*

Cephalopharingæus, *because it beginneth where the head is joined to the neck by the first* vertebra, *and is inserted into the* pharynx.

Crycothyridæus, *because it springeth from the ring-like cartilage, and is inserted into the* thyroides.

Crycoarytenoidæus, *because it beginneth at the ring-like, and endeth at the ewar-like cartilage.*

Corone, *is the process of the lower jaw.*

Coracoides, *like the crows bill.*

Cremaster, *it holds up the stone.*

Deltoides, *because is like to the Greek letter* Δ.

Geneogloſſus, *because it hath its beginning from the chin, and is inserted into the bone of the tongue.*

Glu-

Gluteus, *because it maketh up the buttocks.*

Gastrocnemius, *because it maketh up the calf of the leg.*

Hypsiloglossus, *because it hath its beginning from the bone of the tongue and is inserted into the tongue.*

Hyothyroideus, *because it springeth from the bone of the tongue, and is inserted into the buckler-like cartilage.*

Larynx, *is the beginning of the wind-pipe, derived from* λαρυγίζειν, *which is to shout with an open mouth. It is framed of four cartilages: the first is* Thyroides, *buckler-like: the second and third is* Arteno-des; *ewar-like: the fourth is* Cricoides, *ring-like.*

Myloglossus, *because it hath its beginning at the root of the grinders of the lower jaw, and is inserted into the tongue.*

Mastoideus, *because it is inserted into the dug-like process of the tempil.*

Masseter, *because it serves for eating.*

Pha-

Pharinx *in the throat.* Ploa, *because it is clipped in embracing.*

Rhomboides, *because it is like the mathematical figure called* rhombus, *having four lines, but not the four sides equal.*

Sternohyoidæus, *because it hath its beginning from the* Sternum, *and is inserted into the bone of the tongue.*

Styloceratohyoidæus, *because it springeth from the bodkin-like progress, and is inserted into the points of the bone of the tongue.*

Sphænopharingæus, *because it springeth from the wedge-bone, and is inserted into the* pharynx.

Stylopharingæus, *because it beginneth at the bodkin-like process, and is inserted into the* pharynx.

Styloides, *because it representeth the pin of a Table-book, or a needle.*

Sternohoidæus, *because it beginneth at the* Sternum, *and is inserted into the bone of the tongue.*

Spi-

Spinatus, *which is placed by the sharp brim of the bone.*

Sigmoides, *which is like to the Greek* Σ.

Sphænoides, *the wedge-like bone.*

Sphincter, *the drawer together.*

Thyroaritenoidæus, *because it beginneth at the buckler-like cartilage, and endeth in the ewar-like.*

Trigeminus, *which hath three beginnings.*

Trapezius, *because it hath four sides bounded with unequal lines: for the Geometers so call such a figure.*

The

The explication of the fourth Figure.

1. *The bones of the head.* 2. *The* [bo]*nes of the chain of the back.* [3]. *The ſhoulder-blade.* 4. *The ribs.* [5]. *The* os ſacrum. 6. *The thigh-*[bo]*ne.* 7. *The bones of the knee.* [8]. *The bones of the legs.* 9. *The* [bo]*nes of the feet.*

The explication of the fifth Figure.

1. *The shoulder-bone.* 2. *The elbow-bones.* 3. *The bones of the hand.* 4. *The bones of the back.* 5. *the heel-bone.*

These two figures are to be placed in their order immediatly before the first Chap. of the book of bones.

THE

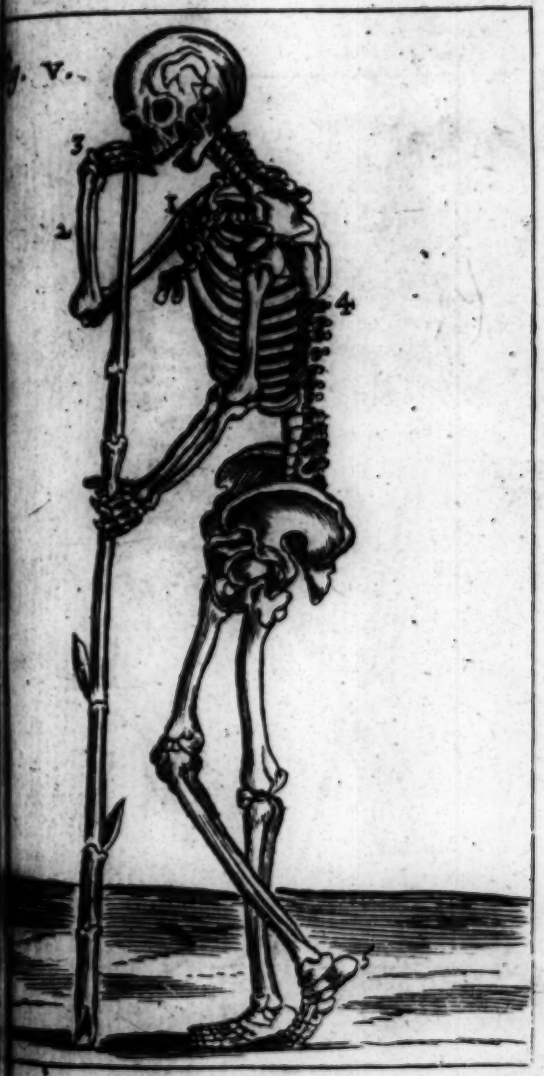
V.
3
2
1
4
5

Fig. IV.

THE FOURTH BOOK

Of the Bones.

CHAP. I.

Of the nature of a Bone.

TO the perfecting of a bone four cauſes concur. Firſt, the efficient cauſe; which is the oſſifick faculty of the ſpirit, unto which the natural heat miniſtreth. Secondly, the material cauſe; which is two-fold: The one is of the generation, the other of the nutrition of the bone. The matter of generation is the thickeſt part of the ſeed: The matter of nutrition is blood, with the which all the

parts of the body are nouriſhed; and not the marrow. For firſt, ſmall bones have no marrow. Secondly, the marrow is hot and moiſt, but the bones cold and dry. The veins and arteries which carry this nutrimental blood, are placed in the ends of the bones, as in the ſcull, thigh-bone, and the great ſcil of the leg. The marrow ſerveth for the moiſtening of the bones, which are dry and ſtill in motion. No nerves paſs to the bones; for they onely feel by the benefit of the *perioſtinum*. Thirdly, the formal cauſe is twofold, by the eſſential it is cold and dry; the accidental is the figure, which for the moſt part is either round or flat. Fourthly, the final cauſe is double: the general, which ſerveth the whole body; and it is threefold: Firſt; they eſtabliſh the ſoft parts; Secondly, they give figure to the parts: Thirdly, they further the motion of the body. The ſpecial is that which is proper to every particular

Lib. de aſſib. ad Tyron.

ar bone. Of the premiſes ſuch a deſcription of a bone may be gathered; *A bone is a ſimilary part, moſt dry and cold, inflexible, compacted of the thickeſt part of the ſeed by the ſpirit, the natural heat conurring, to afford ſtableneſs and figure to the whole body.*

CHAP. II.

Of the natural affections of bones.

THeſe affections are either common to all bones, or proper to ſome onely.

The common are nine. For firſt, a bone muſt be hard, the better to ſtay the body: Secondly, without it muſt be ſlippery, for ready motion: Thirdly, it muſt be white, becauſe it is ſpermatick part and nouriſhed by blood. Fourthly, it muſt be deſtitute of feeling, for avoiding of pain in motion. Fifthly, it muſt be either hollow or ſpongious, to contain a marrowy ſubſtance, for moiſtning of them.

Sixthly, it must be tipped in the ends with a cartilage, and be bedewed with an unctuous humour, to procure an easy motion. Seventhly, that it be covered with a membrane, to preserve it from cariosity, except the three bones of the ear, the parts of the teeth above the gummes. Eighthly, that about the ends it have holes to admit veins and arteries for nourishment. Ninthly, that it be equal. Wherefore the callus wherewith a broken bone is united and nodes in the pox, are not natural affections. By these you may pronounce a bone to be ill affected: First, if it be soft; because it must cause the member to be too flexible. Secondly, if it be dry; for then it is distempered. Thirdly, if it be white; for then it is dead. Fourthly, if it be black; for then it is carious. Fifthly, if its figure be altered; for then it must hinder the action of the part.

The proper affections are four. The first is a cavity; and it is

two

wofold: for it is either deep, and it is called *cotyle*; or ſhallow, and it is called *glene*. The ſecond is a bunching out; and it is either harder than the reſt of the bone, and it is called *apophiſis*; or it is ſofter, and it is called *epiphiſis*. If the bunching out be round, it is called *caput*; under it is the *cervix*; as in the upper end of the thigh-bone, if it be flat, it is called *condilus*: if pointed, *corone*. Other protuberancies are named from the ſimilitude they have from other things; as *ſtyloides*, bodkin-like; *coracoides*, crow-like, &c. The third is inequality: this is ſeen in the nowl for the inſertion of the muſcles. The fourth is ſmoothneſs, as the reſt of the ſkull.

CHAP. III.

Of the differences of the joining of bones together.

THey are coupled together either by jointing or growing together. Jointing is either for manifeſt or obſcure motion. The jointings which ſerve for manifeſt motion are three. Firſt, *Enarthroſis*, and it is when a large head of a bone is received in a deep cavity, as the the thigh-bone in the hip-bone. Secondly, *Arthrodia*; it is when the cavity which receiveth is ſhallow, and the head of the bone which is received ſhallow: ſuch is the articulation of the lower jaw with the tempil-bone. The third is *Ginglymos*; when the ſame bone receiveth, and is received. This falleth out three manner of waies; firſt, when the bone is received by another, and receiveth the ſame; this is ſeen in the articulation of the ſhoulder-bone with the elbow-bone. Secondly, when a bone receiveth one bone, and is re-

received by another: this may be ſeen in the ſpondils of the back, where the middle bone receiveth the upper, and is received by the lower. The third is, when the proceſs of the bone being long and round, is inſerted into another upper bone, and ſo is turned in the cavity as if it were in an axle-tree; ſo is the ſecond *vertebra* of the neck with the firſt.

Articulation for obſcure motion may be obſerved in the articulation of the ribs with the ſpondils, and in the bones of the wriſt and ankle.

Bones grow together either without ſome middle ſubſtance, or with it: Without ſome middle ſubſtance they are coupled three manner of wayes. Firſt, by a line, as the bones of the upper jaw and noſe are coupled: this is called *harmonia*. Secondly, by a ſuture, as the bones of the ſcull are united. Thirdly, when one bone is faſtened in another, as a nail in wood; and are the

teeth faſtned in the gums: this is called *gomphoſis*. If bones grow together by a middle ſubſtance, it is either by a cartilage; and ſo are the ſhare-bones joined, this unition is called *ſynchondroſus*: or by a ligament, and ſo the thigh is joined with the hip-bone: this is called *ſynneuroſis*. Or laſt of all by fleſh, and ſo is the bone of the tongue to the ſhoulder: this is termed *ſyſſacroſis*.

The uſes of the coupling of bones are theſe. Firſt, for motion. Secondly, for perſpiration, as in the ſutures of the head. Thirdly, to give way to the paſſing of ſome ſubſtance as the ſame ſutures to give way to the *dura mater* to make the *pericranium*. Fourthly, for ſecurities ſake, as one may ſee in a member where many bones are. Fifthly, to put a difference between parts, as we perceive in the bones of the upper jaw.

CHAP.

CHAP. IV.

Of the ſutures of the head.

THE bones of the whole body belong to theſe four parts of it; the head, neck, the breſts the lower belly: and the limbs. The head is that part which is above the *vertebræ* of the neck: of it there are two parts, the skul, and the jaw-bones. The skull is that bony ſubſtance which containeth the brain, and is decked with hair. In the deſcription of the bones of the head theſe two things are to be noted; the ſutures, and the number of the bones. The ſutures are either proper, or common: the proper are thoſe which join the bones of the skull one with another; and they are either true ſutures, or counterfeit. The true are thoſe which repreſent two combs joined together by their teeth, theſe are three in number: the firſt is *coronalis*: it is ſeated in the fore part & paſſeth from one tempil to the

other transversly. The second is *lambdoides*, opposite to this resembling the Greek letter Λ. The third is *Sagitalis*: this uniteth both, and beginning at the top of the *lambdoides*, reacheth sometimes to the nose.

The counterfeit, or *mendose* resemble a line onely. The remarkable of these are the *squamosa*, or skale-like sutures: these unite the bones of the tempils with those of the *vertex*, or top. They are two, one above each ear: they begin from the back-side, in the lower part of the *processus mammillares*, and pass through the whole side of the skull. The common sutures are those which belong to the skull, the wedge-like bone, and the upper jaw. The most remarkable are these: first, *frontalis*, by the which the outer process of the *os frontis* is joined with the first bone of the upper jaw. The second is *cuneiformis*, by the which the wedge-like bone, it being in the middle of it, is joi-

ned

ned with the first bone of the upper jaw. The third is *cribrosa*: this is common to the wedge-like bone, and the *sceptum*, or partition of the nose. The sutures have three uses: the first is to stay the brain from tottering by staying of it, by sending some fibres from the *dura mater* through the sutures. The second, to breath out the vapour sent unto the brain from the lower parts. The third to stay fractures from going further.

CHAP. V.

Of the proper bones of the head,

THese are in number six, one of the fore-head, another of the noddle, two of the crown, and two of the temples. First, *os frontis*, the forehead-bone: It is bounded by the coronal and first common suture, before and in the sides by the temporal bones. It is but one of those of ripe age, but double in children, being

being divided by a ſuture paſſing from the coronal to the noſe. On each ſide of this bone in the upper part of the eye-browes, there is a large cavity and often two, from whence two holes paſſe to the hollowneſſe of the noſe.

Theſe cavities contain a clammy ſubſtance, kept in by a green membrane. This receiveth the air containing in it ſome odour received by the noſe to ſtay it awhile before it be ſent to the brain. It hath two holes in the middle part of the eye-brow, which go to the orbit of the eye, by the which, the firſt branch of the nerve of the third conjugation of the brain to the muſcle of the fore-head. It hath alſo four proceſſes; the greater two are ſeated about the greater corner of the eye, but the leſſer two about the leſſer corner.

The bones of the crown are in number two: Before they are joined with the bone of the fore-head, by the coronal ſuture, with

with the noddle bone by the future *lambdoides*, to the tempil-bones, by the *futura squamosa*, without they are smooth, but within unequal, by reason of the prints which the jugular veins of the *dura mater* leave.

Under these are the bones of the tempils. They are joined with the bones of the crown by the *futura squamosa* in the sides; before with the first bone of the upper jaw by its first process, to the nowl-bone, by the counterfeit future. These bones are thin in the upper part like a skale; but below thick, hard and unequal, or rough, wherefore they are called *Petrosa*, rocky. In these are *meatus auditorii*, by the which the sounds pass to the brain. Of the furniture of this passage, peruse *lib.3. cap.23.* of the inward parts of the ear. These bones have sundry holes for the letting of the vessels to the brain.

The nowl-bone is called *os occipitale* and is joyned to the crown-

crown-bones, by the ſuture *lambdoides*. It is the thickeſt of all the bones of the head. It is ſmooth without; but hath ſundry ſinuoſities to receive the meninges ſafely: through the great hole of this bone the *ſpinalis medulla* paſſeth to the back bone.

Theſe bones of the skull have two tables: The uppermoſt is hardeſt, thickeſt and ſmootheſt. The lower is unequal, and pitted to give way to the veſſels diſperſed through the *dura mater*. Between theſe two tables there is a certain ſpongious ſubſtance marrowy, and red, for the nutrition, and humectation of the bones. It is red, by reaſon of the ſmall veins paſſing that way: this ſubſtance hath a threefold uſe: firſt, it receiveth blood for the nutrition of the skull. Secondly, in fractures of the skull, it cauſeth the *porus ſarcodes* the ſooner to grow. Thirdly, it furthereth the diſcharging of vapours from the brain.

CHAP.

CHAP. VI.

Of the bones common to the skull and upper jaw.

HItherto of the bones proper to the skull: Now follow those which are common to it & the upper-jaw: these are three: First, the wedge-like bone, or *cuneiforme*; so called, not that it is like a wedge, but that it is seated in the middle of the bones of the skull and the upper jaw. Before it is joined with the forehead bone, by a bastard, as also to the nowl-bone. At the sides it doth accompany a good way the *os petrosum*, from whence it is separate by a rough chinck. Above, it doth touch the first, fourth, and sixth bone of the upper jaw; below, it toucheth the bones of the palate of the mouth by the wing-like processes. It is thick and solid where it maketh the basis of the skull; it is the thickest of all the bones of the head,

head, where there is a cavity, like to those above the browes; of the processes of it, within the skull, *Sella Turcica*, the Turkish Saddle is framed, in the middle of it the *glandula pituitaria*, which receiveth the pituitous excrements falling from the brain. Without the skull you shall find one on each side, about the sides of the holes of the nose like unto the wings of a Bat, and from thence called *processus aliformes*. It hath sundry perforations, by the which the motory and optick nerves of the eye, and other nerves for the motion of other parts, as vessels also, veins and arteries for nourishment pass. The second common bone is *os cribriforme*, because, like a sive, it hath many holes: by these; smells pass to the brain. A process like to the comb of a Cock, and therefore called *crista galli*, divideth the upper part. Another thin bone passeth above to the instruments of smelling, and below to the nostrils, dividing the

the nose in two parts, the right and the left called *septum nasi*. This bone giveth way to the discharging of the excrements of the brain.

The third common bone is *os jugale*, or the yoke-bone. It is placed on every side of the face between the cavity of the hearing and the first bone of the upper jaw. It is framed of two bones: the hinder is a process of the temple-bone about the passage for hearing: the fore-bone is the process of the first bone of the upper jaw, which maketh the lesser corner of the eye. These two bones are joined by an oblique suture, and make the yoak bone, because like a yoak it stayeth the sides of the upper jaw. It strengtheneth the tendon of the temporal muscle which passeth to the lower jaw, and the muscle *masseter*.

CHAP.

CHAP. VII.

Of the jawes.

NOW follow the bones of the face; they are the jaw-bones, the teeth and bone of the tongue. The jaws are two, the upper & lower. The ſubſtance of the upper jaw is not ſolid, but ſpongious as the pumix ſtone; & unequal, becauſe it is framed of ſundry bones; they are ſix pair, ſix in each ſide. The firſt is *zygomaticum*: it maketh up the beſt part of the yoak-bone, the outer corner of the eye, and a great part of the orbit of the eye. *Zygoma*, or the yoak-bone, is nothing elſe but a bonie half circle made of two proceſſus; whereof the one proceedeth from the *os petroſum*; but the other is a portion of the cheek-bone. The ſecond is *os lachrymale*, it is a round little and thin bone in the inner corner of the eye, whereon the *caruncula lachrymalis* reſteth. In the lower part of it there is a hole which paſſeth to the cavity of the noſe: by

by this the third branch of the third pair of sinews of the brain passeth to the inner membrane of the nose. The third is thin as the former, but quadrangular. It is joined with the bone of the forehead, and the wedge-like bone. The fourth is *os malæ*, the cheek-bone, the greatest and thickest. This containeth all the upper teeth, & maketh up the holes of the nose, and most of those bones which belong to the upper part of the face. It is joined above with the bone of the forehead, but below with the wedge-like bone; before with the *os lachrymale*, behind with the third, and last of all with its fellow. The fifth is long, hard, reasonable, thick; it maketh up the bony part of the nose. It is joined with the cartilages of the nose below; but to the internal process of the *os frontis* above. The sixth doth make up the roof of the mouth with its fellow. Six bones then make up the orbit of the eye. The first is *Frontale*, which

which maketh the upper-vaulted part. The second is placed in the outside, where the lesser corner is, and is a portion of the wedge-like bone. The third maketh up the outside concurring with the former portion of the wedge-like bone. The fourth and fifth make up the inside. The sixth maketh up the lower part. These within the orbit are discerned partly by common, partly by proper sutures.

The lower jaw in those of ripe age is but one bone; but in beasts it is compacted of two bones. It resembleth the Greek letter Δ, or a bow: that portion which pointeth out in the arched part is called the chin. At both the ends of it there are two processes, whereof the one is sharp, and is called *corona*: and receiveth the tendon of the temporal muscle. The other may be called *articularis*, because it serveth for articulation. Within this jaw there is a long cavity which ariseth at the roots of these processes.

ceſſes. By it is the third branch of the third pair of the ſinewes of the brain, together with a vein and artery to the teeth. This may be found out by a ſmall copper wire. This onely is moveable, and both have ſockets for the teeth; they are in number equal with the number of the teeth; they are enlarged by the teeth; and when in old age the teeth fall out, the ſockets draw together, and become ſharp.

CHAP. VIII.
Of the Teeth.

THE teeth are placed in the gummes. Their articulation is not uniform; for they are infixed into the gummes as a nail to a poſt by *gomphoſis*. Their root is tied to the mandible by a nerve, for ſteadineſs, by *ſinneuroſis*; and the upper part compaſſed by the fleſhy ſubſtance of the gumme, by *Syſſarcoſis*.

One thing is to be noted, That the Cutters and Dogge-teeth ſome-

sometimes are implanted into the gummes by a crooked phang: whereby it falleth out, that when such teeth are drawn, the socket must be fractured.

Their substance is hardest of all other bones; yet they do grow: for if a tooth in either gumme be drawn, the tooth opposite to it will in time fill up the vacuity left after the drawing of the other. Their figure repre-presenteth a nail; for in the top they are flat, and in the root sharp. Towards the root they have a cavity compassed every way by a membrane, by the which they have an exquisite sense of feeling the first qualities, heat and cold much affect them, by reason of the membrane; yet second qualities, as hardness and softness, do not offend them.

The teeth have veins from the jugulars, arteries from the soporals, and nerves from the third conjugation. Seeing these vessels proceed from the principal parts, the

the liver, heart, and brain: it is no wonder that children when they breed teeth are troubled with fevers, lasks & convulsions; the principal parts being affected by consent.

As for the number of them, commonly there are found sixteen in each gumme; if there fall out any difference in individual persons, it falleth out by reason of the *molares*.

These are three ranks of teeth. Those of the first rank are called *incisores*, Cutters. Most commonly four are found in each jaw: they have but one phang, and so easily fall out. These first, make way out of the gummes, because the tops of them are sharpest. Those in the second rank are called *canini*, or dog teeth, from their length, hardness and sharpness above the rest. In each jaw there are two at each side of the cutters one; they are called eye-teeth, not that they reach to the orbit of the eye; for they mount no higher then

then the noſtrils; but becauſe ſprigs of the nerves which move the eyes, are carried to them. Thoſe in the third rank are called *molares*, grinders; Becauſe as mills they grind the meat. Moſt commonly they are twenty in number, five in each ſide of every jaw: Of theſe the four next to the Dogge-teeth are perfected in the youth; but the other two come not out until the twenty eight, or thirty years, yea, ſometimes the old age it ſelf come on. In ſome they never appear. They are called the teeth of wiſdome. Theſe have more roots then the other. Thoſe of the upper jaw have more fangs than thoſe of the lower jaw; firſt, becauſe they hang: ſecondly, becauſe the ſubſtance of the upper jaw is not ſo firm as that of the lower. The two of the upper jaw next to the *canini*, have two fangs, the reſt three. Thoſe next to the Dog-teeth in the lower jaw have but one fang, and the reſt but two.

The

The use of the teeth is to chew the meat to prepare it for the stomack to make a laudable *chylus*; wherefore the cutters pull the meat asunder; the Dog-teeth break it, and the grinders make it small, wherefore they are flat in the top, that they may receive and keep the meat, and rough, that they may bruise it the better.

The teeth come out in man the seventh month, and sometimes more slowly, but in beasts sooner, because they are to eat solid meat. Of these teeth, ten in each gumme, to wit, the four cutters, the two Dogges teeth, and four grinders do cast. The fore teeth cast the fourth, fifth, and sixth years of the age, the hinder slower.

CHAP. IX.

Of the Bone of the Tongue.

THis bone is seated under the lower jaw, in the uppermost part of the *Larynx*. It is like to

the Greek vowel υ, or the lower jaw; becauſe it is arched before, and ſpread like hornes behind. There are three parts of this bone. The firſt part upholdeth the tongue, which reſteth upon the upper part of it, and is called *baſis linguæ*. The other two are lateral, and are called *cornua*, or hornes. Theſe bones are tied to the adjacent parts, partly by a fleſhy, partly by a nervous ſubſtance. This bone ſerveth to keep the throat open, that the meat may deſcend into the ſtomack, and the air have paſſage to the wind-pipe while we ſpeak and breath.

CHAP. X.

Of the Bones of the Neck.

HItherto then of the bones of the head, now follow the bones of the neck.

They are of two ſorts, towit, he *claviculæ* or cannel-bones, nd the *vertebræ*. They are called

cla-

claviculæ, because they represent the figure of keys used in ancient times. They are like the great Roman *S*, for they seem to be framed of two semicircular bones: but placed one opposite to another. The substance of these bone is hollow, but more about the heads, and less about the middle. In number they are two, one on each side. Neer the throat they are round; but towards the shoulder flattish. They are tied to two bones, to wit, to the shoulder-blade, and the brest bone. The use of them is to uphold the shoulder-blades, that they should not fall upon the brest together with the shoulder-bone; which falleth out when there is a fracture in them.

The *vertebræ* of the neck are in number seven. The bones of these are harder than of the other because they are more moved. These have first a large hollowness to give way to the *spinalis medulla*: then two holes in the transverse processes, one in each

ſide, through which veins and arteries paſs to the head. Theſe *vertebræ* being uppermoſt are leſſer then the reſt. They have proceſſes oblique, tranſverſe, and thoſe behind. Theſe laſt are forked, if you except the firſt and laſt two. The firſt *vertebra* hath no ſharp corner, leſt the two ſmall muſcles of the head ſpringing from the ſecond *vertebra* ſhould be hurt when the head is ſtretched out; upon this the head is moved forwards and backwards. The ſubſtance of this is harder, ſolider and thinner than that of the reſt, becauſe it is the leaſt, and the cavity of it is biggeſt. The *ſinus* of it where it receiveth the tooth-like proceſs, is garniſhed with a cartilage round, where the proceſs is. Here the head is turned round. As for the ſecond out of the middle of it the tooth-like proceſs doth ſpring long and round. It is joined with the firſt *vertebra* by a broad ligament compaſſing it.

It

If a luxation happen here, it is deadly. The four that lie under these, in all things are like the rest: their lateral processes are large, and parted at the sharp corners, to receive the more muscles. The seventh is the laregest of all. It is like to the *vertebræ* of the breast; for it hath neither transverse processes, neither is the hindermost forked.

CHAP. XI.

Of the Vertebræ of the Breast.

THE bones of the breast are the *vertebræ*, the ribs and breast-bone: As for the *vertebræ*, they are twelve in number, unto which so many ribs answer; whereof seldome doth one abound, more seldom lack. Their bodies are round in the fore-part; but behind somewhat hollow. As for processes, they have four oblique, serving for strong articulation, two lateral, and one sharp behind,

not divided. They have two hollowneſſes, on each ſide one, lined with a cartilage to receive the tops of the ribs. As for holes, they have one large in the middle, which containeth the marrowy ſubſtance, and two leſſer, beſides, on each ſide one.

One thing is to be noted, that the twelfth *vertebra* is not joined as the reſt by the *gyglymos*, but by *arthrodia*. Wherefore extending, bending, and turning are performed by this *vertebra*.

CHAP. XII.

Of the Ribs.

THE ribs are twelve in number. Their ſubſtance is partly bony, partly cartilaginous; the firſt ſerving for firmneſs; the ſecond for articulation. The bony ſubſtance towards the *vertebra* is thick and roundiſh, but towards the *ſternum* flat and thin. The cartilages in bigneſs anſwer the bigneſs of the ribs: for the bigger

bigger ribs have the bigger cartilages, and by the contrary. The ribs in the upper part are blunt, but in the under sharper. In the lower part they are grooped to receive the intercostal vessels, the veins, arteries, and nerves.

These ribs are of two sorts; for they are either long or short: the long reach to the brest-bone, and cause a circle: they are seven in number. These are articulate with the brest-bone by *arthredia*; for in the brest-bone there are sundry cavities, which receive the cartilaginous tops of them. To the *vertebræ* they are joined, their end cartilaginous being received in the hollowness of the *vertebræ*, and are strengthned by ligaments.

The short are semicircular; without arched; within hollow. The uppermost and lowermost are shortest, but the middle longest. These in the fore-part bend upwards, and are joined to themselves, by the cartilages

of the long ribs, if you except the twelfth. In the hinderpart they are articulate and ſtrengthned as the long; but the eleventh and twelfth ſtick in the *vertebræ* by one top onely. The uſe of the ribs is: firſt, to be a defence to the heart and lungs; ſecondly, to further the motion of the breſt; for they ſtrengthen the fleſhy parts.

CHAP. XIII.

Of the Breſt-bone.

THis is not one entire bone, but is framed of three; whereof the uppermoſt and lowermoſt are alike in all ages, and but one. The ſecond in infants is compoſed of three bones, which become one, the ſeventh year of the age being expired. In children all theſe bones are griſtly, but afterward become bony: in aged perſons it ſeem. th one bone, yet it is diſtinguiſhed by three tranſverſe lines, ſhewing the firſt diviſion

diviſion, which are more conſpicuous in the inſide than outſide. Theſe bones are of a red fungous ſubſtance ful of ſmall holes: the upper part is more hard then the lower.

The upper bone is thickeſt and broadeſt; it hath in each ſide a long cavity, lined with a cartilage to receive the points of the cannel bones; between theſe is a pit called *jugulum*. The ſecond bone is neither ſo thick nor broad yet four times as long, it receiveth in its cavities the cartilages of the third, fourth, fifth and ſixth ribs. The third is leaſt of all, yet it is broader than the ſecond, unto the lower parts of which it is joined. To the end of this is annexed the cartilage called *mucronata* or *enſiformis*, or ſword like, but the whole breaſt bone compacted of three bones doth reſemble the handle of a ſword which in ancient times was uſed, being half moon like on each ſide. Under this is the pit of the ſtomock, where the upper and left

orifice of it is called *ſcrobiculus cordis*. The ancients call this orifice *cor*, or heart, becauſe the pains of it are like the pains of the heart, and called *cardialgiæ*.

CHAP. XIV.

Of the vertebræ *of the Loins.*

THE bones belonging to the lower belly are theſe five; *vertebræ*, *os ſacrum*, *os coccygis* and *os iſchii*. The *vertebræ* of the loins are in number five; they are larger than thoſe of the breſt, becauſe they uphold them, and the lowermoſt of them are biggeſt. They are long and ſemicircular: their ſubſtance is ſpongious like a pumix ſtone, and full of holes, to give way to the veins. They have one large hole, to give way to the *ſpinalis medulla* and two ſmall, by the which nerves paſs to the adjacent parts, and veins and arteries come in. As for the proceſſes, the upper and lower differ from thoſe of the

the breſt: for in thoſe the upper parts were knobby, but the lower hollow; but in theſe the contrary is ſeen; for the upper parts are hollow and the lower knobby. The tranſverſe are long and ſmall. The hindermoſt are ſhort and ſtrong. In the backpart of theſe there is a rough hollowneſs to receive *os ilium*.

CHAP. XV.

Of the os ſacrum, *and rump-bone.*

IT is ſo called from the bigneſs. The Latines imitating the Greeks called things large *ſacra*. This is the broadeſt of all the bones of the back, and doth uphold the whole frame of the *vertebræ*. In Infants it is compoſed of five bones, moſt commonly united by a cartilage; but in men of ripe age it ſeemeth but one bone. Theſe bones are *vertebræ*, for each of them hath a body and proceſſes, and hath a large hole to receive the *ſpinalis medulla*

medulla. In this these differ from the other *vertebræ*, because in those the lower part is bigger, but in these lesser; wherefore the uppermost is the biggest, and the lowest the least. These have a large hole to receive the *spinalis medulla*, and other lesser framed of the unition of the *sinus* to send out nerves. As for the processes, the oblique can hardly be discerned but in the first: The transverse are longe, so united that all seem but one. The upper part is thickest; the hindermost are like the *spinæ* of the loins, but less, and the lower lesser; in so much that the lowermost hath no process, but a round bunching out.

To the *os sacrum* the rump-bone is joined by a cartilage: for the first bone of it hath a small hollowness which receiveth the last *vertebra* of *os sacrum*. It is called *os coccygis*, the Cuckoes bill, from the likeness of it. It is framed for the most part of three bones, whereof the lower is still lesser.

leſſer. In men it is bent inward to ſtay the ſtraight gut, and the ſphincter muſcles which are tyed to it; but in women outward, to give way to the matrix in the time of birth. The bones of this are ſpongious and ſoft, and have neither proceſs not any hollowneſs. Their unition with the *os ſacrum* is looſe, to give way to great excrements when they come out; for otherwiſe a luxation might be procured, as in hard labour ſometimes it falleth out.

CHAP. XVI.

Of the Hoop-bone.

THis bone is called *os innominatum*, or without any proper name by ſome; but by the moſt learned *os iſchii*. I have termed it the hoop-bone, partly becauſe it ſtrengthneth the *os ſacrum*, upon which all the *vertebræ* of the back do reſt; Partly becauſe the motion of the inferior

ferior bones are ruled by the muſcles which ſpring from this bone. In children it appeareth framed of three bones, joined by a cartilage until the ſeventh year, but in men of ripe age theſe three, the cartilage being dryed, ſeem but one entire bone. The firſt is called *os ilium*, the huckle-bone, becauſe under it lieth the ſmall gut called *ilium*. This is the broadeſt, and greateſt in figure, ſemicircular, arched without, within hollow. The ſemicircle is called *ſpina*, the arched part *dorſum*, the hollow part *coſta*. It is joined with the *os ſacrum*, and this to it, by mutual proceſſes of the cavities. The ſecond is called *os coxendicis*, or the hip-bone. This being placed between the huckle and ſhare-bones, receiveth in its cavity the thigh-bone. This cavity is large, and hath brims, and is covered with a cartilage. The third bone is *os pubis*, and *pectinis*, or the ſhare-bone; it is ſeated in the fore-part, in the middle it is parted by a cartilage not

not very hard. These three bones, together with the *os sacrum*, make that cavity which is called *Pelvis*, which is bigger in a woman than in a man; in it are contained the guts bladder and part of the matrix, wherefore it is a shield for them. In hard labour the share-bones and the *os sacrum*, will part; the cartilages and ligaments, being bedewed with superfluous humidity, giving way.

CHAP. XVII.

Of the Shoulder-blade.

NOW follow the bones of the limmes, which are legs and armes. The bones of the armes are either above the joint of the shoulder, or under. Above the joint lyeth the shoulder-blade. The substance of it is for the most part hard and solid; the outside is somewhat arched, but the inside hollow, it seemeth triangular. It is joined

to

to ſundry parts by *ſyſſarcoſis*, or concarnation, by means of the muſcles. It is joined with the nowl-bone by the cucullar muſcles; to the *vertebra* of the neck by the ſecond pair of them; to the back by the muſcle *rhomboides*. The broad end is called *acromium*; the other end under this, narrow and thick, is called *cervix*. Here is the anchor-like proceſs, which hindereth diſlocation that way: wherefore ſeldome is the *adjutorium* put out forward. In the inſide of this bone about the middle there is a hole, by the which a vein doth paſs for the nouriſhment of it. The ſhoulder-blade hath a threefold uſe. Firſt, it receiveth the *adjutorium*, and maketh the articulation called *arthrodia*. The cavity of the ſhoulder-blade wh ch receiveth the *adjutorium* is ſhallow, that the arm might readily move every way. This hollowneſs is recompenſed three manner of wayes; firſt, by a ſtrong ligament, which compaſſeth h

seth the joint: Secondly, by the tendons of three muscles, *supraspinatus*, *infraspinatus*, and *subscapularis*, doing the same. Thirdly, by a cartilage which cleaveth orbicularly to the ligament, but not to the hollowness. Secondly, sundry muscles spring from the shoulderblade. Thirdly, it defendeth the back from being hurt.

CHAP. XVIII.

Of the Shoulder-bone.

NOW the bones of the arm, under the joint are three; the shoulder-bone, the elbow-bones, and the bones of the hand. The shoulder-bone is of a hard and solid substance: it is hollow all alongst like a whistle, wherein a marrowy substance is contained. At the two ends it is broad, but round in the middle. In the top of it there is a long chink through which the nervous head of the *musculus biceps* doth pass. In the lower end you shall observe the pully, about the which the

the *ulna* is turned, which is in the inner knob; to the outer knob wch is covered with a cartilage, the *radius* is joined. At the sides of these are two small knobs from whence muscles spring. About the middle of this bone in the inside, you may perceive a hole through the which a vessel doth pass to the marrowy substance for nourishment.

CHAP. XIX.

Of the Elbow-bones.

THese are in number two; to wit, the lesser above called *radius*, and the larger below called *ulna*. Their substance is firm and solid, if you except the additaments of them. Both of them are long, and contain a marrowy substance: they are somewhat rough, by reason of the lines appointed for the muscles.

The *ulna* is large above, lesser below: it serveth for the stretching out and bending of the

the arm, and ſo it is articulate by *ginglymus*; but the *radius* is leſſer above, but longer below, to receive the bones of the wriſt: it is joined by *arthrodia* and ſerveth for the turning up and down of the hand. The *radius* above is received by the *ulna*, but below the *ulna* is received by the *radius*. They are joined together by a long ligament, which ſerveth the internal muſcles from the external. The ſemicircular knob in the hinder part of the *ulna* is called by *Hippocrates ancon*, by *Galen olecranon*. Theſe two bones part about the middle; partly that the *radius* might the more eaſily perform its ſemicircular motion, partly to receive the muſcles.

CHAP. XX.

Of the Bones of the Hand.

THE hand is divided into three parts: the wriſt, called *carpus*; the diſtance between the wriſt and fingers called *metacorpus*;

carpus; and the row of fingers.

The bones of the wrist are eight in number, whereof there are two orders: the upper hath three bones so joined together, that they seem one; the fourth is the least of all, and placed under the little finger. The inferior hath four bones; they are joined together by *harmonia*, because their motion is obscure. The upper rank is joined with the lower part of the *ulna* by *arthrodia diarthrodes*; but the lower with the *metacarpus*, by *arthrodia synarthrodes*.

One thing is to be noted, that the annular ligament doth compass the wrist, and comprehendeth the tendons, which pass through the cavity of the *carpus*.

Metacarpus hath four bones; they are of a solid substance, hollow and round, bigger than those of the finger: that which answereth the pointing finger is biggest, and so still the lowermost are lesser. Between each two a di-

a diſtance is left for the *muſculi interoſſei* of the fingers. Above and beneath they have appendix; by the upper they are joined to the wriſt, by the lower to the fingers; the upper hath a cavity, but the lower a round long top, covered with a cartilage.

In the palm of the hand there is a tranſverſe ligament, the which doth tye the bones of the fingers to the *metacarpium*. The thumb hath no connexion with the bones of the *metacarpium*. Firſt, becauſe it is articulate with the wriſt by *diarthroſis arthrodialis* and hath a manifeſt motion; but the bones of the *metacarpus* are joined to the wriſt by *ſynarthroſis* and have no manifeſt motion. Secondly, becauſe the upper of the thumb is ſhorter than the bones of the *metacarpium*, and not anſwerable to them.

As for the fingers, each of them hath three bones, each of them anſwering a bone of the *metacarpus*, the thumb excepted; their upper

upper additaments have sinuosities, but the lower knobs. These bones are joined by *ginglymus*, and so they onely stretch themselves out, and pull themselves in. As for their obliquation, it doth depend upon the *enarthrosis* of the first bone with the *metacarpus*. Besides these bones in the inside of the hand, some small bones called from their figure *sesamoidea*, like the seeds of *sesamum*, or oily pulse, or Turky millet: they resemble the knee-pan, and seem to serve for the same use; for in strong extensions they strengthen the tendons. In the second joint of the thumbe there are two. The second and third joint of the fore-finger have each one, the rest have two in the first joint. In children they are of a cartilaginous substance.

CHAP. XXI.

Of the thigh-bone.

THE leg is divided into three parts, the thigh, the shank, and

and foot. The thigh hath but one bone: but of all others it is the biggeſt: the two ends of this are to be noted. In the upper part there is a round head; the ſlender part under it is called the neck: it is long and oblique; for if it were ſtraight, it would cauſe haulting by preſſing down the groin. A ſtrong ligament doth keep in the head within the hollowneſs of the *iſchium*. If this ligament be relayed or torn, it cauſeth haulting. From the neck ſpring two prominences: and becauſe the muſcles called *rotatores* are faſtned to them, they are called *trochanteres*. The hindermoſt is the leſſer trochanter; but the lateral or uppermoſt the bigger. The lower end of the thigh-bone hath two flat and low prominences, leaving a cavity in the middle which receiveth the *aphyſis* of the *tibia*. And again theſe prominences are received by the cavities of the *tibia*, by a looſe *gynglymus*. The lower part of this articu-

articulation is called the knee, the hindermoſt the ham. Above the knee appeareth the bone, not joined with any other bone, called the pan, or *patella*: it is ſomewhat round, about two inches broad, plain without: having many holes, but within bunched, covered with a cartilage. It is ſet before the thigh-bone and the *tibia* to ſtrengthen the articulation; for otherwiſe the thigh-bone would ſlip out forward in going down any hill. It cleaveth to the knee by the thick tendons of the ſecond, third, and fourth muſcles, which extend the *tibia*, and paſs by the knee to it, and are implanted into the fore-knob of it. Two ligaments faſten the articulation of the the thigh-bone with the *tibia*: the one is circular, compaſſing both, the other long, placed between two bones, reddiſh, by reaſon of the veins there. Behinde there are two ſeed-bones; tyed to the two beginnings of the

first muscle which moveth the foot to strengthen them. Great wounds of the ham are mortall, by reason of the great vessells which pass that way.

CHAP. XXII.

Of the bones of the shank.

THE shank is composed of two bones. The great focill is called *tibia*, the lesser *fibula*. In the upper part it hath a processe, which is received by the hollowness of the thighbone. It hath also two long cavities for the receiving of the two prominences of the thigh-bone. To help the shallowness of these cavities, there is joyned by ligaments a moveable cartilage soft, slippery, and bedewed with an unctuous humour, which being thick, becometh thinner towards the center: it is called *cartilago lunata*, the Moon-like cartilage. It is joyned to the thigh-bone by *gynglymus*. The *fibula* onely cleaveth to the *tibia*, and toucheth not the thigh-bone. The *tibia*, causeth the internall

ancle. About the middle it hath a conſpicuous hole to let in a vein for nouriſhment. This bone is triangular, having three lines; the ſharpeſt before is called *ſpina*; of the poſterior the inward is blunt; but the outward ſomewhat ſharp. The *fibula* is a firm bone alſo, and as three ſquare likewiſe, one line is before, and two behind; the upper end hath a hollowneſs covered with the cartilage in the inner ſide, which receiveth the laterall knob which is under the appendix in the upper end of the *tibia*, the lower end maketh the outer ancle.

CHAP. XXIII.

Of the bones of the Tarſus.

OF the foot as of the hands there are three parts, *tarſus*, *metatarſus*, and the toes. The *tarſus* is the diſtance between the lower end of the two focills, and the beginning of the five bones which are articulate with the toes: It hath ſeven bones; the firſt is *talus*, or the game-bone, the

the great and ſmall focill are joyned with it and ſo the foot is ſtretched out, and drawn in, as alſo moved to the other ſide; all beaſts with a cloven foot have this bone. In the upper part it is articulate with the *tibia* by *ginglimus*, and ſo below with the heel-bone. The ſecond is called *ciſos*, the heel-bone under the *talus*, this receiveth the great tendon called *nervus Hectorius*, compoſed of the tendons of the muſcles of the ſhank. Above it receiveth the *talus*, below it is received by *os cubiforme*. The third is called *naviculare*, from its figure; for it is long, without bunched, but within hollow, being covered with a cartilage, where it receiveth the end of *oſtalus*. The fourth is called *cuboides*: becauſe it hath ſix ſides, repreſenting a *cubus*. In the forepart it is joyned to the fourth and fifth bone of the *metatarſus*; in the hinder with the heel-bone; but in the inſide, it, with the reſt of the ſides are joyned with no

bones, but are free. The three ensuing are called *cuneiformia*, or wedgelike bones; for above they are broad; but below they are narrow; being joyned, they represent a vault: for above they are arched, but under hollow, to receive the tendons and muscles, and not to touch the ground, for that the *cuboides* onely doth. The first of those bones is the greatest, wedgelike seated in the inside of the foot. The second is the least, placed in the middle. The third is that which is mean between both in bigness. These three are joyned with the bootlike bone, or *os naviculare*.

CHAP. XXIV.

Of the rest of the bones of the Foot.

THe *Metatarsus*, or instep, hath five bone: for one is appointed for the staying of the great toe, which is not in the hand.

They are solid without, hollow within, longer than the bones of the back of the hand. That which stayest the thumb is thickest, the longest

longeſt is that which ſtayeth the next toe: and although all the reſt of the toes are of an equall thickneſs, yet the uppermoſt are longer than the lowermoſt: the lowermoſt parts are inſerted into the hollowneſs of the firſt joynts of the toes; but the uppermoſt end are received by the bones of the *tarſus*. That which ſtayeth the thumb is received by *cuneiforme majus*: the ſecond by *cuneiforme minus*: the third by the third wedgelike bone: the other two by the two tops of *os cubiforme*.

The bones of the toes are in number fourteen; for the great toe hath onely two, but the reſt three. Theſe bones are ſolid without, and hollow within; they have three joynts, and two proceſſes: the lowermoſt hath two knobs, received by the top of the lower, but the uppermoſt receiveth: the uppermoſt joynts have a deeper hollowneſs, becauſe they receive the ends of the bones of the inſtep. The ſeed-like bones are ſeated as they are in the

hand, two are in the second joynt of the thumb, which strengthen the tendon of the muscles which bend it.

CHAP. XXV.

Containing an explication of some terms which are found in Anatomical Authors in the Doctrine of the Bones.

Cotyle are termed deep cavities in the articulation of the bones.

Glene, or *glenoides* are shallow cavities.

Epithysis, or *appendix* is called a bone which groweth to the end of another bone. It is of a spongious substance, at the first gristly, but afterward becometh bony; it may be seen; in both the focils of the legs are both the ends.

Apophysis, or *tuberculum* is a part of a bone not added, but bunching out above the smooth superficies, if it be sharp, it is called *spina*.

Condylus, is a low prominence, and flat.

Corone

Corone is a ſharp prominence.

Supercilia, or *labra*, are the upper brims of the cavities of the joynts.

CHAP. XXVI.

Of the number of the Bones.

IN Ancient times they were holden to be 246. according to this diſtick.

Adde quater denis, bis centum ſenaque habetis.
Quam te multiplici condidit oſſe Deus?

But the diligence of late Anatomiſts have found out more.

Thus then they may be ſummed:

The head hath	8
The lower jaw	1
The upper jaw	11
The teeth are 32. ſometimes	28
The *ſpina* hath	24
The *os ſacrum*	5
The ribs are	24
The breſt-bone 1. but compoſed of	3
The Channel-bones	2
The ſhoulder-blades	2
Of the *Iſchium*	3
In the arms	60

In the feet	64
The bones of the ears	6

The great seed-like bones of the great toes.

If with some Anatomists you reckon 24. seed-like small bones in the two hands, and so many in the two feet, and two in each ham, and the eight bones in each hand, between the *carpus* and *metacarpium*, and the bony substance annexed to the *cuboides* in both the feet; in old persons you shall have 54. more, which being joyned to 246, make up 302 expressed thus.

Ter centum & binis compactum est ossibus istud,
Quod gerimus corpus, non est quod plura requiras.

If thou 302 bones chance to find,
Few or none are left behind.

CHAP. XXVII.

Of a Cartilage.

A Cartilage is a similary part, dry and hard, yet not so as a bone; flexible, which a bone is not; framed to stay the soft part, and to repell

repell the injuries of external hard bodies. 1. Then it stayeth the soft parts. 2. It defendeth them. 3. They cover the ends of the bones which have a loose articulation. 4 They knit bones together: as is seen in the sharebone.

The differences are taken first, from the figure; so as the cartilage of the brest bone is called *ensiformis*, & those of the *Larynx sigmoides* like C. Secondly, some are solitary, not joyned with other bodies, as those of the ears and eyelids: some are joyned, as most of the rest. Thirdly, some still continue cartilages, some degenerate into bones, as in women, the cartilages of the ribs wch lye under the brest: for these growing very big, they become bony, the better to hold them up. They are in sundry parts of the body. 1. In the head there are four, to wit, of the eye-lids, nose, and ears; and the *trochlea* of the eye. 2. In the breast there be three, to wit, the cartilages of the *larynx*: the smal pipes of the wind-pipe, dispersed through

the lungs, and *cartilago ensiformis*. 3. The long ribs are joyned to the *sternum* by cartilages. 4. The *vertebræ* of the back are joyned together by cartilages. Last of all sundry are seen in the articulations, which are loose, and in the conjunction of bones.

CHAP. XXVIII.

Of a Ligament.

A Ligament is a similary part without feeling, in substance mean, between a cartilage and a membrane, appointed firmly to knit the joynts.

Of the ligaments some are membranous (such are those which inviron the joynts;) some cartilaginous, as those which are between the joynts, as is seen in the articulation of the thigh-bone with the *coxendix*.

Ligaments are to be found in divers parts of the body. First, the bone of the tongue hath two strong ligaments, one on each side. Besides, on each side it hath round ones, by the which it is tied to the adjacent

adjacent parts to ſtay it in the middle of the mouth. Secondly, the tongue hath a ſtrong membranous ligament in the lower part about the middle of it. About the end of it the *frænum* is to be ſeen, which if it come to the fore-teeth, it hindereth the motion of the tongue and ſpeech. Children being ſo troubled, are ſaid to be tongue-tied, and muſt have it cut. Thirdly the ligaments which tye the *vertebræ* of the breſt and loins, the ribs with the *vertebræ*, and the ribs with the breſt-bone, are membranous. Fourthly, ſundry are to be ſeen in the belly. The firſt tieth the *os ilium* to *os ſacrum*: the ſecond tieth the *os ſacrum*, to the *coxendix*. The third joyneth the ſharebones, and is cartilaginous. The fourth compaſſeth them circularly, and is membranous. The fifth compaſſeth the hole of *os pubis*, & is membranous. Fifthly, in the arm theſe appear. 1. Five tie the *adjutorium* to the ſhoulder-blade. 2. The bones of the elbow, *ulna* and *radius*, are tied firſt one to another; ſecondly, to

to the shoulder-bone; and thirdly, to the wrist by membranous ligament. 3. There are two annular ligaments, which being transvers, direct the tendons which pass to the fingers, they are two; one in the outside of the tendons of the extending muscles; the other in the inner side for the tendons of the contracting muscles. 4. The bones of the wrist, back of the hand, and fingers, have membranous ligaments. 5. In the leg these may be found out.

First, the thigh-bone is tyed to the *Coxendix*, by two ligaments.

2. The lower end of it is tyed to *Tibia*, & *Fibula* by six ligaments.

3. The *Tibia* is joyned to the *Fibula* by a membranous ligament.

4. *Tibia* and *Fibula* are joyned to the ancle by three ligaments.

5. The ancle is tyed with the bones of the foot by five ligaments

6. The bones of the instep and toes are tyed with such ligaments as those are which are seen in the hand.

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